

PC MAGAZINE

VOLUME 8 NUMBER 7
APRIL 11, 1989

**PC Labs Tests
15 Fax Boards
That Really
Work**

No Hassle Fax

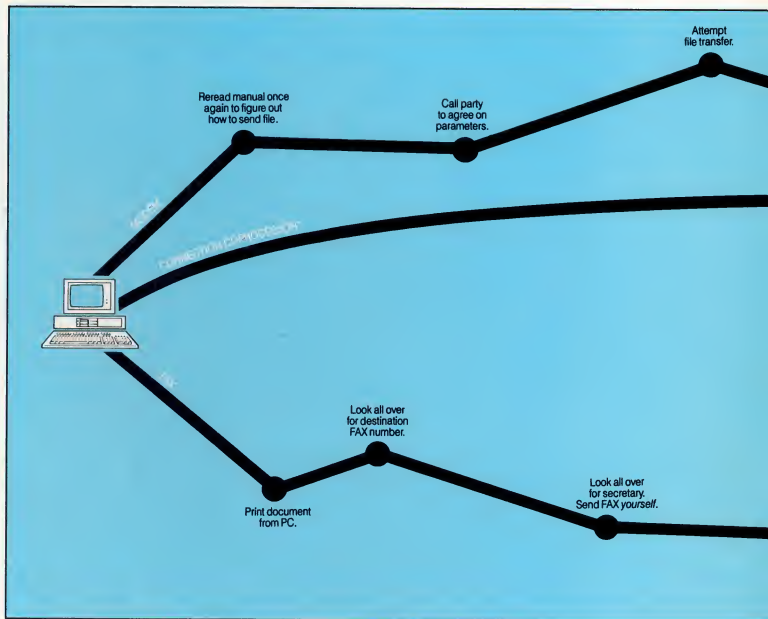
- DOS and Unix:
Marriage of Convenience?
- More Power for Your LaserJet:
6 PostScript Add-in Boards
2 HP Speedup Boards
Plus Free PC Magazine
Printing Utility
- What IBM Forgot to Tell You
About Presentation Manager

**After Hours:
Managing
Your Money 4.1
Plus 3 New Tools for Personal Finance**

Budget Category	Type	Annual Total	Tax Category
Auto/Gas/Personal	Expense	\$948.00	Net + Tax Category
Gifts	Expense	\$300.00	Net + Tax Category
Groceries	Expense	\$4,986.71	Net + Tax Category
Household Expense	Expense	\$1,000.00	Net + Tax Category
Insurance/Business	Expense	\$275.00	Insurance
Insurance/Personal	Expense	\$1,000.00	Net + Tax Category



Intel announces



Announcing the first non-stop communications route between businesses anywhere in the world.

Intel's Connection CoProcessor.™

It's a whole new way to send and receive programs, files, text, graphics and electronic messages. Not just between PCs, but with fax machines as well.

The Intel Connection is a new communications coprocessing board that frees your PC from the task of communicating.

Which means you can work on your computer non-stop—even while

sending a document as big as the New York phone book.

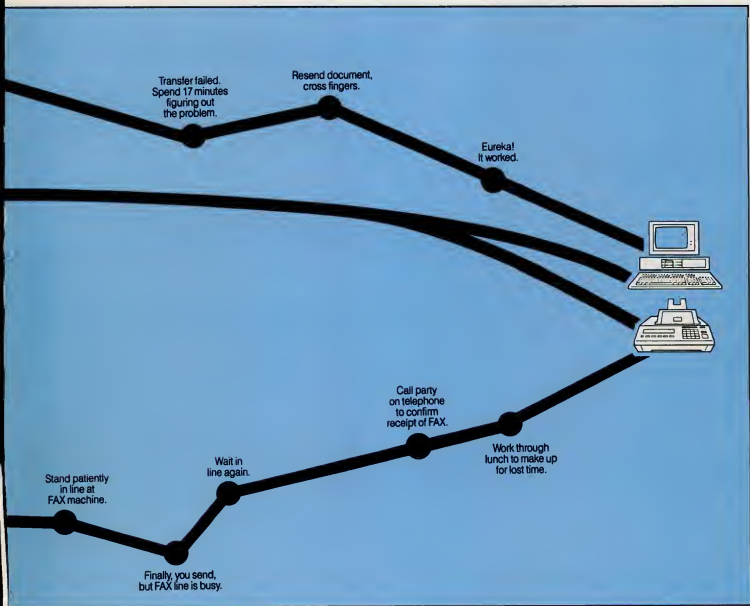
Now your faxes or files can fly cross country. And you can still be zooming around in your flight simulator. Or writing that letter to your biggest account. Or recalculating your spreadsheets for tomorrow's meeting. Without interruption or downtime.

And when you fax, there are no more stopovers at the printer, or cooling your heels in line at the fax machine. Because Connection lets you do everything without leaving your PC.

And when you send files directly to



non-stop flights.



another Connection-equipped PC, you won't have to fiddle around with modem parameters or protocols. Because the Connection CoProcessor sets them for you. At 9600 bps.

Best of all, Connection supports CAS,* a new communication standard that is supported by major software and hardware developers like Symantec,[™] Borland[®], DCA[®], Microsoft[®], and WordPerfect.[®] Which means you can send, for example, a word processing file to your London office, without ever exiting your WordPerfect program.

You just send the document directly from your application. That's it. There isn't any complicated

Corporation. DCA is a registered trademark of Digital Communications Associates, Inc. Microsoft is a registered

communications software to learn.

And everything is backed by toll-free technical support and a five-year warranty from Intel.

So what are you waiting for? Call 800-538-3373 now for a free demo disk.

Because with Intel's Connection CoProcessor, communication is really going to take off.

intel[®]

This is about

At this moment, millions of Lotus® 1-2-3® users are faithfully awaiting the arrival of a product called Release 3. A character-based product that promises greater power and greater productivity for serious spreadsheet users.

As soon as it gets here.

In the meantime, we have a question:

If Release 3 is in fact character-based, and the entire personal

computing industry continues moving toward *graphics*-based environments, is it wise to wait for Release 3? Or consider the alternative.

Actually, you can do both. Because you have nothing to lose by seeing the other side of the spreadsheet story, and trying it for yourself.

It's called Microsoft® Excel. The spreadsheet specifically designed for graphic environments—the industry's emerging standard.

Five minutes in front of a demo will show you the fastest,

easiest, most enjoyable way to crunch your numbers. Thanks to an incredibly intuitive design that exploits innovations like Micro-

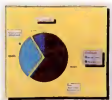
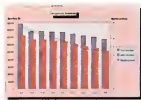
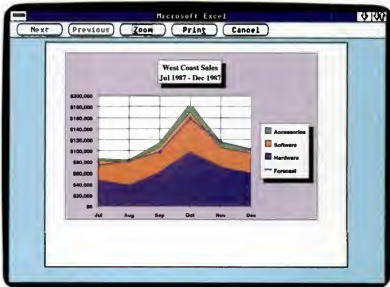
soft Windows, OS/2 Presentation Manager and, of course, the Macintosh®

You're a loyal Lotus user. If you're a bit skeptical, we fully understand that. We also anticipated it. So we've made sure your hard-earned equity in 1-2-3 is not

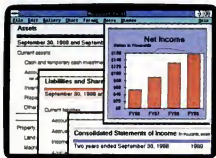
obsolete. In fact, we've not only made a transition to Microsoft Excel attractive, we've also made it easy: Microsoft Excel actually reads and writes



Microsoft Excel. Or, how to see Lotus 1-2-3 Release 3 from a whole new perspective.

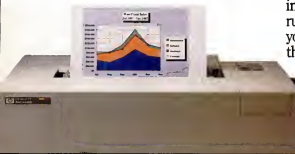


As you know, with 1-2-3 your ability to customize worksheets and charts is limited. As you may not know, with Microsoft Excel the possibilities are limitless.



Unfortunately, 1-2-3 won't let you move, size, and link an unlimited number of files at the same time. Fortunately, Microsoft Excel will.

t Lotus 1-2-3.



No more wasted trips to the printer. Microsoft Excel comes with Print Preview for true WYSIWYG. Unlike Release 3.

1-2-3 files and even helps translate macros. It also offers the convenience of 1-2-3 on-line help—so you can expect a surprisingly smooth

West Coast Sales

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Product A	100	120	150	180	200	220	250	280	300	320	350	380	3000
Product B	80	90	110	130	150	170	190	210	230	250	270	300	2000
Product C	60	70	80	90	100	110	120	130	140	150	160	170	1300
Product D	40	50	60	70	80	90	100	110	120	130	140	150	1000
Product E	20	30	40	50	60	70	80	90	100	110	120	130	500

Yes, graphics-based Microsoft Excel was designed around a mouse. You can also use it without one.

transition. In fact, the slash key you punch to access your 1-2-3 commands is the same key that can access Microsoft Excel commands—you don't have to relearn a thing.

Another issue:
hardware.



As Lotus may or may not have told you, Release 3 will need a substantial investment in new hardware. The same hardware that runs Microsoft Excel. All we're saying is, if you're committing to new machines, make the most of those new machines. Something Release 3 simply won't.

But, using is believing. So we've made it convenient to get a sample of Microsoft Excel in your hands. Simply call us at (800) 541-1261, Dept. J14 for a free sample disk of your own. It's worth the call. It's worth the experience.

In fact, we're so confident about Microsoft Excel that we're offering a no-questions-asked, money-back guarantee good through January 1990. Which means we're actually willing to guarantee our current technology against Lotus technology that isn't even available yet.

All of which brings us to a decision millions of you are about to face:

Upgrade to character-based Release 3, or upgrade to the power and simplicity of a graphics-based spreadsheet. We're not saying it's an easy decision.

Just an inevitable one.

Microsoft
Making it all make sense.



For even more convincing, call for a sample disk. The disk is free. But the experience is priceless.

QUICK
ACCESS

EASY
EDIT

Vg

THE MATCHMAKER
GOLDEN BOW SYSTEMS

TM



Fast free-form retrieval—
any format, any disk path

Integral multi-window editing

Hot links to your applications

Pull-down menus

Mouse support

DOS and OS/2

(800) 284-3269

\$270 US ship \$3
CA orders add 7%

GOLDEN BOW SYSTEMS
2870 5th Avenue
San Diego, CA 92103

(619) 298-9349

FAX (619) 298-9950

TELEX 201520 GBS UR

VOLUME NUMBER 7

WHAT'S INSIDE

There's a visionary in some people all of the time, and in all people some of the time—especially when it comes to choosing tomorrow's systems. As many PC users question whether to make the move from DOS to OS/2, *PC Magazine's* coverage of this controversial operating system will continue to focus on issues relevant to both end users and programmers.

In the spirit of forward thinking, we're not suggesting that you rush out and buy OS/2 today or even this year. Instead, we've asked contributing editor Charles Petzold—whose *Environments* column is the first on-going series devoted to OS/2 programming to appear in any magazine—to write an article about the future of PC application software. That story has been influenced by a dramatic change in the modes of interaction between user and computer, culminating in a more inviting entrée into computing: the graphical user interface (GUI). For OS/2, that means the Presentation Manager.

Although the PM was released officially only recently, it's not new to Petzold. As the author of the book *Programming the OS/2 Presentation Manager* (Microsoft Press, 1989), he was the first journalist to see this new GUI before it went public, and he has been writing programs for it for more than a year.

Petzold describes the rationale for centering *Environments* on programming for the PM this way: "Because the PM is the primary environment for future OS/2 applications, programmers should be looking at PM the earliest. They're the ones



Contributing editor Charles Petzold created the opening art for his article by writing a PM program.

who have to write the applications that the rest of us will use." The viability of OS/2 depends on programmers' getting their education now, because the operating system will become useful to most users only when a sufficient number of PM applications exist.

Just as programmers should find Petzold's column a harbinger of the new world of object-oriented environments, end users should find his feature article in this issue an invaluable introduction to concepts that are likely to determine the look and feel of the next generation of applications. With this kind of reporting, no one can say we haven't done our part to prevent the future from arriving prematurely.—Robbin Juris

PC Magazine: The Independent Guide to IBM-Standard Personal Computing. ISSN (#0894-8587) is published bi-monthly except in July and August for \$29.97 for one year (\$22 annual), \$44.97 for two years, and \$81.97 for three years. Additional postage \$5.00 per copy or \$22.00 per year for Canada and all other foreign countries. Ziff Davis Publishing Co., a division of Ziff Communications Co., One Park Ave., New York, NY 10016. Second-Class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 2409, Boulder, CO 80521-0409.



Vg is a trademark of Golden Bow Systems.

CIRCLE 369 ON READER SERVICE CARD

PC MAGAZINE



Everything it takes to add PostScript to your LaserJet II, including HP's blessing.

"The QMS JetScript controller is the best way available to add PostScript capabilities to a Hewlett-Packard LaserJet Series II printer."

—PC Week
Sept. 19, 1988

Hewlett-Packard* and QMS* have made it easy to give your LaserJet Series II[®] the desktop publishing power of the PostScript[®] page description language.

The new QMS JetScript[™]

JetScript is the only Adobe PostScript controller upgrade authorized by HP and designed specifically for the LaserJet Series II. JetScript gives your printer the industry-standard page description language to accompany HP's PCL printer language. This expands your laser printing capabilities. Increases overall printer performance. Yet preserves HP functionality and warranties.

Do it yourself JetScript is easy to install. Just plug in two cards (one in your personal computer*, the other in your printer), connect a cable and install the software.

The result is a PostScript system with 35 resident Adobe typefaces, three megabytes of RAM, and QMS ASAP[™] (Advanced System Architecture for PostScript) proprietary technology for superior performance. All for less than half the cost of a new PostScript laser printer.

New forms of expression The speed and power of JetScript combine to give your LaserJet Series II a form of expression that's found only with PostScript.

Simply, PostScript opens up the full range of possibilities for desktop publishing. You have complete control over the final look of the page, down to the last exacting detail. PostScript allows for an infinite number of font variations and sizes. That makes PostScript's limitless flexibility and power the perfect complement to your LaserJet Series II, giving you the high-quality output you require.

Impressive results People have come to expect impressive results from QMS—one of the first companies to bring the power of PostScript to laser printing, and now with more PostScript-based products than any other company.

You'll get the same results from the new JetScript. After all, it has HP's blessing.

Laser Connection is a sales and marketing subsidiary of QMS. Call **1-800-523-2696** for the location of your nearest Laser Connection dealer.

*JetScript available for IBM PC-XT[™], IBM PC-AT[™], HP Vectra[™] and compatible personal computers, or the IBM PS/2[™] Model 30.

LASER CONNECTION[™]
A QMS Company

The following are trademarks of their respective companies: HP, Hewlett-Packard, LaserJet Series II, HP Vectra of Hewlett-Packard, QMS, JetScript, ASAP Laser Connection of QMS, Inc. PostScript of Adobe Systems, IBM PC-XT, IBM PC-AT and IBM PS/2 of International Business Machines Corp.

CIRCLE 259 ON READER SERVICE CARD

©1989 Laser Connection





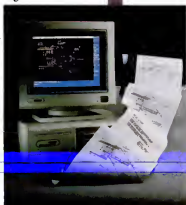
COVER STORY

PC to Paper: Fax Grows Up

M. David Stone/ The fax machine has changed the way people do business, and the partnership of PC and fax promises to achieve more than either technology can offer alone. With streamlined software, enhanced performance, and improved communications functionality, the 15 systems tested here show that PC-based fax packages are coming of age—to the benefit of PC users and businesses the world over 94

Features Table 102
Performance Tests 118

Cover Photography:
Thom O'Connor



A fax machine in every PC:
the wave of the future? Page 94.



FEATURES

OPERATING SYSTEMS

An Alliance of Convenience:
DOS Under Unix

Kaare Christian/ Offering the best of two possible worlds, Locus Computing's *Merge 386* and Interactive Systems' *VPIix* make it possible to run the vast library of DOS applications under the powerful Unix operating system. How well do these products perform?

Should you consider going this route if you need a multitasking operating system? Our reviews answer these questions and a host of others 149

Features Table 158

Performance Tests 172

OPERATING

ENVIRONMENTS

The Truth About
Presentation Manager

Charles Petzold/ OS/2 is a relatively new operating system, and its powerful graphical user interface, the Presentation Manager, is newer still. Appearing for the first time in OS/2 1.1, the Presentation Manager will make possible a new generation of PC software. But does its arrival mean that now is the time to make the move to OS/2? 187

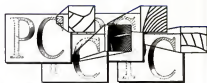
ADD-IN BOARDS

Add-in Boards for the HP
LaserJet: Post-Purchase
PostScript

Alfred Pao/ Don't lament your purchase of a LaserJet rather than a PostScript printer. With a PostScript add-in board from Conographic, Destiny Technology, Eicon Technology, QMS, or Princeton Publishing Labs, your LaserJet can do anything a PostScript printer can do—only faster 205

Features Table 212

Performance Tests 222



The many shades of
HP LaserJet
add-in boards,
page 205.

EDITORIAL PRODUCT
INDEX

A list of products reviewed in this issue, plus a guide to utilities, programs, and tips in the Productivity section ... 396

FIRST LOOKS

Hands On:

- First Presentation Manager application: Borland's souped-up *SideKick*
- *SuperCalc 5* handles multiple spreadsheets, adds optional 1-2-3-like interface
- Core ships the first bus-mastering hard disk controller for the Micro Channel
- Redesigns *PC Tools Deluxe*: You name it, it's got it
- *Corel Draw!*: Vector-based drawing package combines power and simplicity.
- *Data Junction* adds intelligence to database, spreadsheet file conversions
- *CompuAdd 286-20*
- *Pizazz Plus* stores screens in DTP formats
- *Vtune*: Smart ASCII imports for *Ventura Publisher* 33

AFTER HOURS

- *Quotron Open Windows* gives you access to the stock info that the pros use
- *Andrew Tobias' Managing Your Money*: How to make the most of what you've got
- *Andrew Tobias' Checkwrite Plus*: A program for balancing your checkbook
- *Wealth Insurance*: A look at the financial future 406



Quotron Open Windows: on-line, real-time stock info for PCs, page 406.

PRODUCTIVITY

PC LAB NOTES

The Attraction of PC MagNet

Gus Vendittol Join the thousands of readers who have already been drawn to PC MagNet and log on to an easy way to download our utilities. Here's a glimpse inside our on-line service, and a quick note from each of the contributors. 233

UTILITIES

Landscape Mode to the Rescue

Michael Holmes and Bob Flanders! Save time and paper when printing out program listings and other ASCII files on your LaserJet printer. LASERLST puts two full pages of text on a single sheet of paper 257



ENVIRONMENTS

How to Move the TIMELINE Window

Charles Petzold! Continuing to explore ways of using nonstandard windows in *PM* programs: here's an easy way to add your own moving logic to *TIMELINE* 281

POWER PROGRAMMING

An Introduction to Indexed Files

Ray Duncan! The pros and cons of different kinds of indexed files and file index structures are explained ... 291

SPREADSHEET CLINIC

Douglas Cobb and Steven Cobb! Printing the current time in the header or footer of a *Lotus 1-2-3* worksheet; calculating time in a *SuperCalc* worksheet 303

USER-TO-USER

Neil J. Rubenking! Maximize free memory with an alternative *AUTOEXEC*; a batch file that displays your computer's ID 313

POWER USER

Craig L. Stark! Create your own pop-up menus using *WordPerfect 5.0*'s advanced macro features 319

LANGUAGES

Robert L. Hummel! A quicker way to search text in BASIC; Turbo Pascal routines for creating your own editor; an automatic word-align function in *Turbo Pascal 5.0* 325

PC TUTOR

Robert L. Hummel! Prevent batch files from ending prematurely; examine large files with *DEBUG*; produce the *ESC* character you need to issue *ANSI* commands 333

CONNECTIVITY CLINIC

Frank J. Derfler, Jr.! Shortcuts for loading *NetWare* drivers for new networking cards; combining operating systems on the same cable isn't a problem; replacing a mini with a *LAN* 341

VIEWPOINTS

LETTERS TO

PC MAGAZINE 15

PC ADVISOR

Joe Desposito! Beef up a laptop cursor; an inexpensive black-and-white monitor 27

BILL MACHRONE

What Can the Mac Teach Us? 65

JOHN C. DVORAK

Dvorak's Hall of Infamy ... 71
Inside Track 73



JIM SEYMOUR

The 2nd Anniversary 77

WILLIAM F. ZACHMANN

The OSF's CXI: A Thorn in IBM's Side 83

STEPHEN MANES

Communications Breakdown 91

Direct Marketing

Connection 345
Marketplace 372
Reader Service Card 397
Coming Up 399
Advertisers Product Index 401
Index to Advertisers 405



Editor-in-Chief and Publisher Bill Machrone
Associate Publisher J. Samuel Huey

Executive Editors Bill Howard, Luisa Simone, Gus Venditto

Workgroup Systems Editor Frank J. Derfler, Jr.
West Coast Editor Lee The
Senior Editor Miti Jones
Senior Technical Editor Tony Rizzo
Senior Editor, Technical Columns Craig L. Stark

Managing Editor Paul B. Ross
Assistant Managing Editor Diane D'Angelo

Manager, Copy Edit Linda Louk
Associate Editors Kellyn Betts, Robin Juris, Trudy Neuhaus, Edward L. Perratore, Donald P. Willmott

Production Editor Karen A. Carter
Assistant Production Editor Jeanne Albrecht

Staff Writer Catherine D. Miller

Staff Editors Glen Becker, Mary Kathleen Flynn, Jonathan Matzkin, Rock Miller, Sharon Terdeman, Jennifer Zaino

Assistant Editors Elisa J. Hirsch, Stephanie K. Losee, Lonnie Lum, Michael W. Muchmore, Ann Ovodov, M. Stephanie Ricks, David Rosen, David M. Stanton, Jonathan Sveda
Editorial Assistants Alan Cohen, Lori Gruning, Susan L. Hayes, Stephanie Izarek, Ilona Price, Matthew J. Ross, Paula Seefeldt, P.J. Springer

Proofreaders Joseph J. Antinori, Rink Murray

General Business Manager Tom McGrade

Associate Business Manager Allen Wollman

Assistant to the Publisher David Baker

Administrative Assistants Christina Okang, Freida T. Smallwood

Editorial Secretaries Donna Alfred, Anthony J. Giglio, Wendy Murch

Secretaries Mark Miller, Susie Shuttlesworth

Database Assistant Dolores Williams

Contributing Editors Frank Bican, Douglas Cobb, Steven Cobb, Ray Duncan, John C. Dvorak, Stephen Manes, Michael J. Melford, Edward Mendelson, Charles Petzold, Jeff Prossie, Robin Raskin, Winn L. Rosch, Neil J. Rubenking, Jim Seymour, Richard Hale Shaw, M. David Stone, Ethan Weiner

Manager, PC MagNet Christopher Barr
Assistant Manager, PC MagNet Wendy W. Huang
Editorial Liaison, PC MagNet Michael Cohn
Sysop, PC MagNet Ross M. Greenberg

Director, Design and Electronic Publishing Gerard Kunkel

Art Director Jerry Tortorella

Associate Art Directors Charles Conover, Mariano Nicieza, Denise Platin

Senior Graphic Designer Laurie Vance

Assistant Art Director Natalie Chu

Layout Artists Leigh Margerson, Yvonne Valdenegro

Graphic Artists Gary W. Kaplow, Gerard Sarantonio

Director, PC Labs John Dickinson

Manager, PC Labs Bruce Freeman

Senior Project Leader Joe Desposito

Senior Programmers Stuart R. Greenberg, Salvatore P. Ricciardi

Project Leaders Robert W. Kane, Pamela J. Milland, Bill O'Brien, Philip F.H. Rose, Randol Tigrett

Network Manager Joseph F. Rizzo

System Support Specialists Mario Baladeserini, Stephen W. Plain, Charles Rodriguez

Inventory Control Manager John R. Delancy

Inventory Control Technician Peter Bastide

PC Labs Coordinator Karen Williams

Receptionist Janice Collins

Director, Marketing Kevin Russell

Manager, Market Research Nicholas Andes

Public Relations Director Jessica Kersey

Public Relations Coordinator Stacy O'Connell

Subscription Director Paul Stafford

Single Copy Sales Director Robert Woltersdorf

Production Supervisor Susan DePiero

Advertising Production Managers Michael Genzale, Vicki Egan Root

Advertising Production Assistants Wendy Mylett, Maryann Pritchett

Editorial Production Manager Dennis Fitzgerald

Editorial Production Coordinator Melissa Maurer

Production Systems Supervisor Linda Harms

Production Systems Staff Melvin Foster-Poetsch, Charles Milburn

Group Vice President William Lohse

Editorial Director Paul Somerson

Advertising Office One Park Ave., New York, NY 10016, (212) 503-5100

ZIFF-DAVIS PUBLISHING COMPANY

President William Lohse
Group Vice Presidents William Lohse, J. Scott Briggs
Senior Vice President, Marketing Paul H. Chook
Vice President, Operations Baird Davis
Vice President, Production Roger Hermann
Vice President, Controller John Vlachos
Vice President, Creative Services Herbert Stern
Vice President, Research Marian O. White
Vice President, Circulation Bert Lacy
Vice President, Circulation Services James Ramsley
Vice President, Marketing Services Ann Pollak Adelman
Vice President, Classified Advertising Alicia Marie Ivans
Vice President, Development Seth Alpert
Director of Planning Gary A. Gustafson
Production Director Walter J. Terlecki

ZIFF COMMUNICATIONS COMPANY

Chairman William B. Ziff, Jr.
Vice Chairman Philip B. Korsant
President Kenneth H. Koppel
Executive Vice President Stephen C. Kabler
Senior Vice Presidents Philip Sine, Hugh Tietjen
Vice Presidents Donna Dono, Steven C. Feinman, J. Malcolm Morris, William Phillips
Secretary Brian A. Abrams

HOW TO CONTACT THE EDITORS

The editors of PC Magazine want to hear from you. Complaints, questions, and, of course, compliments should be sent by letter to One Park Ave., New York, NY 10016—it's probably the best way to reach us. You can also reach us electronically via MCI Mail (our account number is 157-9301) or by leaving a note on PC MagNet when you've finished downloading the latest utility. If nothing but a human voice will do, call us at (212) 503-5255.

We are unable to look up past stories, recommend products, or diagnose problems with your PC by phone. If you bought a product advertised in PC Magazine, are dissatisfied, and can't resolve the problem, write (do not call) Michael Gratzon, Advertising Department, at One Park Ave. Include copies of correspondence.

PC Magazine is under no obligation to review unsolicited products. All submissions accepted for publication become the property of PC Magazine.

PC MAGNET

PC MagNet, an on-line service, is a source for PC Magazine's utilities (both programs and source code), the PC Labs Benchmark Test programs, and an index of articles printed in the magazine. Callers can upload submissions to PC Magazine's Productivity section and join forums to discuss articles printed in PC Magazine with the authors and other readers. PC MagNet provides electronic mail and a gateway to CompuServe. For more information see the Productivity section or call (212) 503-5108.

PERMISSIONS, REPRINTS

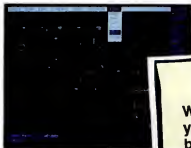
Material in this publication may not be reproduced in any form without our permission. If you want to quote from an article or use PC Magazine's logo in conjunction with an Editor's Choice designation, write Jean Lamendorf, Licensing Director, for information on reprints, write Jennifer Locke, Ziff Davis Publishing Co., One Park Ave., New York, NY 10016.

SUBSCRIPTION QUESTIONS

If you want to subscribe to PC Magazine, if you have a question about your subscription, or if you're moving, call or write: PC Magazine, P.O. Box 54093, Boulder, CO 80322, (303) 447-9330. A 1-year subscription (22 issues) costs \$44.97. Canada and foreign: add \$37.00 per year. New subscriptions and address changes take 6 to 8 weeks to process. For back issues, write Felicia Hunter, Back Issues Department, PC Magazine, P.O. Box 5999, Cherry Hill, NJ 08034. Send \$8 per issue (check or money order, \$9 outside the U.S.).

Editorial and Business Office: One Park Ave., New York, NY 10016.
Editorial (212) 503-5255, **Advertising** (212) 503-5100. PC Magazine is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp. Entire contents Copyright © 1989 Ziff-Davis Publishing Co., a division of Ziff Communications Co. All rights reserved. Reproduction in whole or in part without permission is prohibited. The following are trademarks of Ziff Communications Co.: PC, PC The Independent Guide to IBM-Standard Personal Computing, PC Magazine, PC Mart, PC Labs, PC-Communications, PC Tutor, User-to-User, Power User, Power Programming, Spreadsheet Clinic, The PC Utilities, PC Lab Notes, PC Advisor, First Looks, PC Pipeline, PC MagNet.

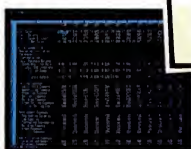




Get VGA graphics resolution on any EGA with an monitor for AutoCAD, Windows and Ventura Publisher.



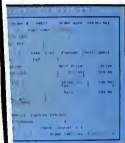
Change fonts, colors and screen sizes in popular word processors like WordStar & Word Perfect. 80 x 60 s



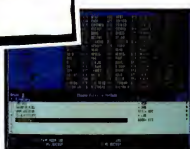
See more rows and columns in 1-2-3 or Symphony. Build a 12-month forecast without scrolling left and right.



en when you write code or review diors like Brief. 120 x 43 shown.



fields to any dBASE data we.



Use color and compression to enhance Feedback Plus. Run terminal emulators like YTERM with 132 columns.

Announcement:

We interrupt our regularly scheduled advertising to bring you these messages (posted on the CompuServe electronic bulletin board by users of UltraVision).

"I am simply speechless at the amazing program you guys have produced. It has had a greater impact on my daily computer use than any other program I have ever used. I am now almost constantly in 60 line mode."

"A brilliant piece of software! Does everything it claims to do."

"I recently got 3 UV kits and have 12 more on order. In my humble opinion, it is one of the best products to hit the PC scene in the last couple years."

"Anyone with an EGA should get UltraVision."

"Better resolution than any PS/2. Congratulations on a truly fantastic product."

"The cost savings (not to mention the better quality text) over a VGA is a public service."

"The increase in speed with UltraVision was immediately noticeable. Two to three times faster."

"This is one of the few products I have purchased for my PC that was worth the money. Thanks."

UltraVision

Supercharge your EGA.

Introducing UltraVision™ software that turns your EGA into a state-of-the-art display. You get more bells and whistles than the latest video cards, without replacing your current hardware.

Goodbye, drab colors.

Was your favorite application designed by a color-blind programmer? No problem. We've unlocked the full 64-color EGA palette so you can change screen colors to make any application look just the way you like.

Put on a new face.

You'll love the way our new typefaces look on your screen. Choose from a library of styles

including Sans-serif, Courier, Script, or novelty styles like **It's a Party**, **Data** and **Old English**. Change styles in a flash.

Stop scrolling around.

UltraVision comes with a special Booster Card that plugs into the feature connector on your EGA. Now you can see more and scroll less in a host of popular applications. Choose screen dimensions up to 132 x 43.

UltraVision looks great on standard EGA monitors, and it gives you even more on autosync displays, like VGA-quality graphics and super high resolution character definition. Give your eyes a break. Your world will look a whole lot better.

UltraVision is from the makers of SeeMORE™, SmartNotes™, Look & Link™, and @BASE™. UltraVision for VGA and plasma displays coming soon.

UltraVision

Please send me:

_____ copies of UltraVision at \$119.95 each. Include \$3.75 shipping per order. (\$12 outside USA and Canada). Mass. residents add 5% sales tax.

Payment: ☐ VISA ☐ MC ☐ AMEX
☐ DINERS ☐ CHECK

CARD# _____ EXP DATE _____

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

To order, send coupon or call toll-free. Company PO's accepted by mail or fax.

800-445-3311

personics

63 Great Road, Maynard, MA 01754
508-897-1575 FAX 508-897-1947

EGA display without UltraVision.

EGA display with UltraVision.

These unretouched photos demonstrate how UltraVision improves character resolution on any EGA with autosync monitor. Normal EGA characters are defined in an 8 x 14 matrix versus 9 x 19 for UltraVision.

Winning Combination ...

With Performance, Aggressive Prices and
On-Site Service! 

GE Computer Service



PC MAGAZINE,
EDITORS CHOICE
JANUARY 31, 1989
SAYS,

"In short: Austin Computer Systems has a winning combination of classy parts, smart design, high performance, and aggressive pricing, all backed by a GE on-site service contract. How can you lose?"

PRICE MATRIX		
Monitor	Harddrive	286/12.5
TTL Monochrome	100 MB 1.1	\$1895
	40 MB 1.1	\$1995
	20 MB 1.1	\$2295
	10 MB 1.1	\$2495
EGA Color	100 MB 1.1	\$2495
	40 MB 1.1	\$2595
	20 MB 1.1	\$2795
	10 MB 1.1	\$2995
VGA Monochrome	100 MB 1.1	\$2195
	40 MB 1.1	\$2295
	20 MB 1.1	\$2595
	10 MB 1.1	\$2795
VGA Color	100 MB 1.1	\$2495
	40 MB 1.1	\$2595
	20 MB 1.1	\$2795
	10 MB 1.1	\$2995
PRO VGA Color	100 MB 1.1	\$2995
	40 MB 1.1	\$3195
	20 MB 1.1	\$3395
	10 MB 1.1	\$3595

★ Austin 286/12.5 Cache

- Intel 12.5 MHz 80286 Processor
- Shadow Ram Caching (BIOS Caching)
- 40 MB 1.1 Fast Access Hard Drive
- 32K Hard Disk Cache
- Hi-Po Disk Caching Software
- GE 1 Year On-Site Service Contract
- 14" EGA Display Monitor
- Paradise EEGA Autoswitch Display Adapter
- 1 Full MB of Ram Expands to 4 MB on Board, 16 MB Total
- EMS LIMM 4.0 Support
- Dual Floppy Harddisk Controller
- American-Made Motherboard
- 3.5" 1.44 MB or 5 1/4" 1.2 MB Floppy Disk Drives

- Phoenix BIOS
- Keytronic Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- 1 PS/2 Mouse Port
- Clock with Battery Backup
- 80287 Math Co-Processor Socket
- FCC Class B Approved
- Users & Technical Reference Manual
- Diagnostic & Utility Programs
- Fully DOS & OS-2 Compatible

Complete EGA Color, 40MB system as above

\$2295⁰⁰
\$2495⁰⁰ VGA



Austin 286/20 Cache

Standard Features:

- 80286 Processor running at 20 MHz
- Hi-Po Disk Caching Software
- Shadow RAM Caching
- 26 MHz Performance Rating (LandMark)
- 1 MB of RAM on Board
- GE 1 Year On-Site Service Contract
- 40 MB 1:1 Fast Access Hard Drive
- 14" VGA Color Monitor
- VGA Analog Display Adapter
- American-Made Motherboard
- Small Footprint Chassis
- Dual Floppy/Harddisk Controller
- 3.5" 1.44 MB or 5 1/4" 1.2 MB Floppy Disk Drive
- Keytronic Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- Clock with Battery Backup
- 80387 Math Co-Processor Support
- Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program
- Fully DOS & OS/2 Compatible

Complete VGA Color, 40MB System as above

\$2695⁰⁰



Austin 386/SX

Standard Features:

- True Intel 80386 SX Processor
- 1 MB of 32 Bit RAM on Board
- GE 1 Year On-Site Service Contract
- 40 MB 1:1 Fast Access Hard Drive
- Hi-Po Disk Caching Software
- 14" VGA Color Monitor
- VGA Analog Display Adapter
- American-Made Motherboard
- Small Footprint Chassis
- Dual Floppy/Harddisk Controller
- 3.5" 1.44 MB or 5 1/4" 1.2 MB Floppy Disk Drive
- Keytronic Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- Clock with Battery Backup
- 80387 Math Co-Processor Support
- Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program
- Fully Unix & OS/2 Compatible

Complete VGA Color, 40MB System as above

\$2795⁰⁰



Austin 386/20 Cache

Standard Features:

- True Intel 80386 Double Sigma Processor running at 20 MHz
- 64K Static RAM Cache (on Board)
- Hi-Po Disk Caching Software
- 30 MHz Performance Rating (LandMark)
- 14" VGA Color Monitor
- VGA Analog Display Adapter
- 80 MB 1:1 Fast Access Hard Drive
- GE 1 Year On-Site Service Contract
- 1 MB of 32 Bit RAM on Board Expands on 8 MB/32 Bit RAM on Board
- 1-32 Bit, 6-16 Bit, 1-4 Bit Slots
- American-Made Motherboard
- 5 Bay DeskTop Chassis
- Dual Floppy/Harddisk Controller
- 3.5" 1.44 MB or 5 1/4" 1.2 MB Floppy Disk Drive
- Keytronic Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- Clock with Battery Backup
- 80387 Math Co-Processor Support
- Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program
- Fully Unix & OS/2 Compatible

Complete VGA Color, 80MB System as above

\$3995⁰⁰



Austin 386/25 HyperCache

Standard Features:

- True Intel 80386/25 Processor running at 25 MHz
- 128K Static RAM Cache (on Board)
- Shadow RAM Caching (Bios Caching)
- Hi-Po Disk Caching Software
- 42 MHz Performance Rating (LandMark)
- 14" VGA Color Monitor
- VGA Analog Display Adapter
- 80 MB 1:1 Fast Access Hard Drive
- GE 1 Year On-Site Service Contract
- 1 MB of 32 Bit RAM Expands to 16 MB/32 Bit RAM
- 1-32 Bit High Speed Memory Slot
- 2-32 Bit Intel Standard Slots and 4-16 Bit slots (usable as 8 Bit)
- American-Made Motherboard
- 5 Bay DeskTop Chassis
- Dual Floppy/Harddisk Controller
- 3.5" 1.44 MB or 5 1/4" 1.2 MB Floppy Disk Drive
- Keytronic Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- Clock with Battery Backup
- 80387 & Witek Math Co-Pro Support
- Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program
- Fully Unix & OS/2 Compatible

Complete VGA Color, 80MB System as above

\$5995⁰⁰

Deskdrive A Winner!

"How Can You Lose?" You Can't...

Extremely High Performance!

Memory Caching, Shadow RAM, Integrated I/O, and Fast Access Hard Drives make our systems scream along . . . But we don't stop there! All Austin computers include 16 bit Video Adapters, the fastest available; 1:1 or ESDI Hard Drive Controllers to ensure the fastest access possible; and a Hard Drive Caching Program so good that PC Magazine voted it the best in its class for 1988!

With the Fastest RAM, the Fastest Video, and the Fastest Hard Drives, you get a system that simply can't be passed up!

American Made Quality

Austin Computers, including the motherboards, are made and assembled in the USA! The latest design and manufacturing techniques allow us to offer the highest quality products at low prices!

A World Class Support Program

Featuring . . .

GE Computer Service

GE On-Site Service

A Full One Year On-Site Service Contract from GE Computer Service is included with every Austin computer. Should your system fail, a GE technician will come to you and resolve the problem . . . Usually within 24 hours! Extended 2nd-5th year contracts are available.

Unlimited Toll-Free Support

If you require assistance for any reason, call our Toll Free 1-800 number. Our highly trained support personnel are available six days a week.

30 Day Money Back Guarantee

If you're not satisfied for any reason, just return your system within

30 days for a full refund on the hardware price.

Fully Loaded Systems

We configure every Austin computer to include a Monitor, Video Adapter, Hard Drive, Floppy Drive, Keyboard, and a full array of I/O ports . . .

If you desire a custom configuration, or additional options, just tell our sales personnel how you want it!

Most orders are prepared for shipment within two days.

Exceptional Pricing!

Performance, Support, Quality, and Features that you demand, at prices you won't believe!

No other system has it all . . . DeskDrive one today!



PRICE MATRIX CHART					
Monitor	Drive	26/20	26/32	26/40	26/25
VGA Monochrome	11" 800	\$2,995	\$2,995	\$2,995	\$2,995
	12" 800	\$2,795	\$2,995	\$2,795	\$2,795
	14" 800	\$2,595	\$2,795	\$2,595	\$2,595
VGA Color	11" 800	\$2,995	\$2,995	\$2,995	\$2,995
	12" 800	\$2,795	\$2,995	\$2,795	\$2,795
	14" 800	\$2,595	\$2,795	\$2,595	\$2,595
PRO VGA Color	11" 800	\$2,995	\$2,995	\$2,995	\$2,995
	12" 800	\$2,795	\$2,995	\$2,795	\$2,795
	14" 800	\$2,595	\$2,795	\$2,595	\$2,595

CALL AND ORDER TODAY!

1-800-752-1577

AUSTIN
COMPUTER
SYSTEMS

MONDAY - FRIDAY 9AM - 7PM CENTRAL

WEEKENDS 10AM - 5PM

Fax (512) 454-1357

Overseas (512) 454-5106

Toll Free Support 1-800-752-1171

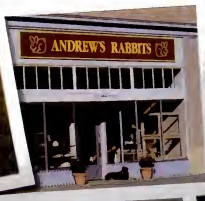
7001 N. LAMAR - SUITE E-100 - AUSTIN, TX 78751

IBM, AT, VGA, and PS/2 ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THE IBM CORPORATION. OTHER BRANDS AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE HOLDERS. PRICES AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE. CALL FOR CURRENT PRICING. FOR EXACT DETAILS ON WARRANTIES, CALL OR WRITE: GE COMPUTER SERVICE, GE, AND THE GE LOGO ARE ALL TRADEMARKS OF THE GENERAL ELECTRIC CORPORATION.

Accounting So Sophisticated Lets You



Small business with basic needs will get off to a jack-rabbit start with ACCPAC® Easy.



As your business grows by leaps and bounds, move up to ACCPAC BPM®.



Even the most sophisticated breed of business is handled by ACCPAC® Plus.

Sales volume. Market share. Percent increase over prior year.

The simple truth is, the business of business is to grow.

The sad truth is, most accounting software can't handle that. Built-in obsolescence often seems to be a standard feature.

Which is one of the most compel-

ling reasons to consider the ACCPAC® line of accounting software. Because it is precisely that: a line. A smooth, efficient path for expansion. Allowing you to transfer data when you trade up.

The starting point is ACCPAC Easy, our primer. Offering "excellent audit trail features," according to

g Software ated It Even Multiply.

reviews in *Software Digest*.

And here's where you trade up to: our five module workhorse, BPI Accounting. With power and flexibility that let you tailor systems to your way of working. *PC World* calls its intuitive interface "the most hospitable," while naming BPI "an outstanding value."

Finally, for the largest networks or most specific requirements, there's our powerhouse, ACCPAC Plus. With a complete range of full-featured modules. And pre-designed, off-the-shelf solutions for a wide variety of businesses. Rated "best in its class" by *InfoWorld*, Plus offers the ultimate in control.

And we offer even more. The stabil-

ity and support that come from the world's leading independent software company. Offering the broadest line available. Letting you work in MS-DOS or OS/2, then graduate to a local area network without replacing software.

But when you do upgrade, we protect your investment in staff training and data. Even giving you significant rebates for the ACCPAC software you already own. Call 1-800-531-5236.

In Canada call 1-800-663-6904.

We'll tell you more about ACCPAC, our rebate program and what we can do for your business. Namely, help it grow.

ACCPAC

Computer
Associates

**COMPUTER
ASSOCIATES**
Software superior by design.

© 1989 Computer Associates International, Inc. 1240 McKay Dr., San Jose, CA 95131

CIRCLE 102 ON READER SERVICE CARD

Of the more than
250 hardware products reviewed
by InfoWorld in 1988,
our CompuStar® received
the highest total score awarded.

CompuStar®



See us at
COMDEX/Spring '89
April 10-13, 1989
McCormick Place
Chicago, Illinois
Booth 8671

Simply stated, it's number one.

CompuStar is the world's first and only multi-processor, convertible bus™ microcomputer. It can be configured with up to 13 bus expansion slots (PS/2 and/or PC/AT compatible), your choice of interchangeable 8086, 80286, or 80386 microprocessors and up to seven disk/tape devices.

To receive a reprint of the InfoWorld review, as well as a complete CompuStar product information kit, call 803/796-7800.



Wells American.

Corporate Headquarters: 3243 Sunset Boulevard • West Columbia, South Carolina USA 29169 • 803/796-7800 • FAX 803/796-7092

PS/2, Personal Computer AT and AT are trademarks of International Business Machines

CIRCLE 515 ON READER SERVICE CARD

LETTERS TO PC MAGAZINE



COMPARING APPLES AND IBMS

I can't believe Jim Seymour gave the Apple LaserWriter IITX his endorsement ("The Best of 1988" *PC Magazine*, January 17, 1989). It is a great printer, but only for Mac users and PC users with AppleTalk (a.k.a. LocalTalk) boards. Like the original LaserWriter, it doesn't even have a parallel port, which is Apple's backhanded slap at anything IBM.

Steve Roth
Seattle, Washington

THE NEXT WAVE IN PUBLISHING?

Bestinfo should not be mentioned in the same breath as desktop systems ("Power Publishing," *PC Magazine*, December 27, 1988). Bestinfo does not compete with



them; it competes with companies like AteX, Penta, and Xyvision.

Perhaps it is useful in discussing Bestinfo to eschew the term "professional desktop system" and use the term Fourth Wave publishing system. The Fourth Wave, as described by the *Seybold Report*, stands for a new generation of systems that perform functions on mainstream platforms instead of expensive proprietary platforms.

Jim Bessen
President and CEO
Bestinfo Inc.
Media, Pennsylvania

LOOKING BACK, LOOKING AHEAD

Your end-of-the-year issue was great. The millennium has arrived: John Dvorak rightly labeled the AT bus an "old zombie," and *PC Magazine* recognized that the Micro Channel bus is a genuine technical advance—not just a marketing ploy. I loved it!

Peter H. Strong
Los Angeles, California

ENTERTAINING DVORAK

John C. Dvorak's critique of certain IBM employees' social graces, followed by his comments about SAA ("My Dinner with IBM," *PC Magazine*, January 31, 1989), raises questions about his objectivity. What does it take to favorably impress a computer columnist? I am not a big fan of many of IBM's recent actions and I agree that IBM is not the best business entertainer in the industry, but so what?

It is not their business, nor that of any other vendor, to entertain computer columnists. Would Dvorak's stated dislike of the Micro Channel architecture and IBM itself have been mollified by a good steak, a bottle of wine, and pleasant conversation (all free, of course)?

Mark Tucker
East Montpelier, Vermont

I do not always agree with John C. Dvorak, but I must say that he was correct in his observations on IBM. Most IBM employees do have more class and tact than those Mr. Dvorak encountered at dinner. But, in Big Blue's drive for greater profits, a school of thought has formed in the heart of its market-driven management that puts little value on personal relationships. Instead, getting the job done, regardless of cost, is the first priority.

These people have either forgotten, or were never taught, that professional etiquette begins with personal etiquette. Not only is it an honor and a privilege to have the mealtime company of another, but it is the obligation of the party extending the invitation to pick up the tab. There is a difference between playing hardball like a sportsman and playing hardball like a prima donna athlete. Some of the people who work for IBM should be sent down to the minor leagues.

David N. Heller
Reston, Virginia

STRAIGHT TALK ABOUT DRIVES

Your writers communicate valuable information in a most effective manner. I needed to know more about the hard disk drive in the Model 30 286 ("What's Old Is New," *PC Magazine*, January 17, 1988), and your article contained all the information I needed and then some.

George E. Remp, Jr.
Upper Darby, Pennsylvania

WHY NOT SHAREWARE?

I feel you committed a great injustice by not mentioning shareware in your list of awards and kudos ("The Best of 1988"). Not everyone requires the ultimate product from some distant software house that cannot or will not support the user. For most of us, shareware is an excellent route to greater productivity.

James R. Plosay
Monterey, California



■ LETTERS

TIARA LANCARD DESERVES BETTER

I can't believe the short shrift Frank Derfler gave the Tiara LanCard E ("Building Workgroup Solutions: Ethernet Cards," *PC Magazine*, January 31, 1989). The 8-bit LanCard is the throughput equal of the fastest 16-bit board. Its degradation from zero to four stations is a remarkable 7 percent, and it's faster over four stations than any other 8-bit card with zero stations.

Michael Friedlander
Ossining, New York



CLIPPED AGAIN?

Bill Machrone's kudos for the Curtis Clip were premature ("The Best of 1988," *PC Magazine*, January 17, 1989). There's no spring in the clip, so after you've tucked a couple of sheets of paper under it a couple of times, single sheets fall off. And, of course, the more sheets you use each time, the more it needs the next time.

This product is another example of American marketing: build it, hype it, and sell it. Let the public discover that it doesn't work. By then, the company's been bought out and the executives have floated to their Caribbean cabanas on platinum parachutes.

Ron Rodriguez
Lafayette, California

SEND ME A LETTER

What's all the fuss about printing envelopes on a LaserJet ("Printing the Perfect Envelope," *PC Magazine*, December 13, 1988)? Why all the ink for special programs and utilities?

I use a Wang PC and a LaserJet to print #10 envelopes and have never had a problem. I position the cursor on the first letter of the inside address and Enter GL + E. The macro picks up the inside address, drops it on the last page of the document, adds the correct number of returns to position the copy, and prompts me to change the left margin to 70 when printing. Perfect every time.

Peter Obletz
New York, New York

NON-TECHIES NEED HELP, TOO

Although your magazine contains very useful information, I feel that some of your articles tend to assume that the reader is already a technical expert on the topic under discussion. I would like to be able to gain new information from your articles, not just enhance my existing knowledge.

Lori Trawick
Montgomery, Alabama

CONNECTIONS GET YOU SO FAR

The two-edge connector board issue sounds like a nightmare to John C. Dvorak ("EISA Come, EISA Go!" *PC Maga-*

■ The Wells modular system is a quantum leap in hardware refinement, taking removable backplane technology in desktop publishing to its logical conclusion.

zine, December 27, 1988), but unless I must plug and unplug a board each time I boot up my computer, I'm not going to worry about it. In the 2 years that I've had my AT system, I've only opened it twice and unplugged a board once.

Why doesn't Mr. Dvorak design and produce his own board, and we'll see who follows him?

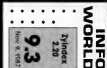
Rick Carlson
Meriden, Connecticut

I DON'T DO WINDOWS

Stephen Manes really hit home ("New Versions, Old Pains," *PC Magazine*, October 11, 1988). Most so-called upgrades now favor windows. This is fine for illiterates, but when one learned computing with only 16K of BASIC and 16K of RAM, a window is wasted memory. I'll stick with my uncluttered screen.

Walt Stevenson
Pittsburg, Kansas

"A word cruncher's dream!"
ZyINDEX
PC Magazine



ZyINDEX 3.0 is the only full text retrieval program that:

- retrieves vital information from 20 mbytes of files in 5 seconds
- works with 20 popular WP programs plus Dow Jones, Compuserve, ASCII, Lotus 1-2-3
- offers major LAN compatibility
- comes in 3 versions from \$95 to \$695, according to your needs

More than a text retrieval program, ZyINDEX will actually change the way you manage information. For free demo diskette, call:

1-800-544-6339

ZyLAB™
Corporation

3105-T North Wilke Road
Arlington Heights, IL 60004
FAX 312-632-1129 Phone: 312-632-1100

CIRCLE 316 ON READER SERVICE CARD
© 1989, ZyLAB Corp.

	1986	1987	1988
Direct Exchanges (Note E)	\$28,500	\$17,500	
Impairments	\$184,576	\$176,549	\$87,445
Installations (Note F)	\$4,500	\$17,500	
Additions to fixed assets	\$189,200	\$211,549	\$187,445

Statement of Income		1988
Income from operations	\$1,130,375	
Interest and dividends	\$76,433	
Income before income taxes	\$1,206,808	
Provision for income taxes	\$472,000	
Net income	\$734,808	
Earnings per share	\$1.01	

Sources of working capital:			
	1986	1987	1988
Net income	\$734,808	\$682,894	\$734,808
Non-funded charges to income			
Deferred income taxes	(\$32,872)	(\$27,568)	
Depreciation and amortization	\$79,832	\$8,267	\$11,200
Working capital from operations	\$781,768	\$753,593	\$846,008
Sale of fixed assets	\$48,476	\$74,067	\$37,699
Issuance of common stock	\$7,844	\$43,888	\$34,864
Issuance of preferred stock	\$517,880		
Total sources	\$1,355,968	\$871,548	\$878,571
Uses of working capital:			
Additions to fixed assets	\$189,200	\$211,549	\$187,445
Additions to other assets	\$186,834	\$66,919	\$125,639
Dividends paid on capital stock	\$38,764	\$89,523	\$117,690
Total uses	\$414,838	\$368,991	\$430,774
Increase in working capital	\$941,130	\$502,557	\$447,797

Summary Schedule:		1988
Land	\$250,000	
Buildings	\$171,320	
Furniture	\$72,146	
Machinery	\$200,000	
Other	\$100,000	
Furniture	\$100,000	
Buildings	\$100,000	
Land	\$100,000	
Buildings	\$100,000	
Land	\$100,000	

Look&Link

Add-in for 1-2-3

With dynamic linking you can build great 1-2-3 applications and you'll never run out of memory. Values from linked sheets automatically feed into the primary sheet.

Boundless Worksheets.

LOOK & LINK™ for 1-2-3® Release 2 lets you build applications that span across worksheets. You get dynamic linking and consolidation plus the ability to see two sheets on the screen at the same time.

Be in two places at once.

Have you ever wanted to look at one worksheet while using another? Now you can. A special pop-up window lets you see a second worksheet with the push of a key.

Build multi-sheet applications.

With LOOK & LINK, any worksheet can pull information out of other worksheets on disk or expanded memory (optional). You might link a 1040 tax worksheet to its supporting schedules.

Link a cell or a range. Link values or summary information. Perform table lookups. It's easy - move the cursor in the pop-up window to define the link cells.

Consolidate many sheets into one.

LOOK & LINK also does automatic consolidations, complete with audit trail. You might sum twelve monthly P&Ls to create an annual report or sum

regional sales worksheets to produce a national consolidation.

LOOK & LINK is from the makers of @BASE™, SeeMORE™, SmartNotes™ and UltraVision™ for the IBM PC and compatibles.

Look&Link

Please send me:

_____ copies of LOOK & LINK at \$99.95 each. Include \$1.75 shipping per order. (\$12 outside USA and Canada). Mass. residents add 5% sales tax.

Payment: ☐ VISA ☐ MC ☐ AMEX
☐ DINERS ☐ CHECK

CARD# _____ EXP DATE _____
NAME _____
ADDRESS _____ PHONE _____
CITY _____ STATE _____ ZIP _____

To order, send coupon or call toll-free.
Company PO's accepted by mail or fax.

800-445-3311

personics

63 Great Road, Maynard, MA 01754
508-897-1575 FAX 508-897-1947

PC4/89

Hardware, Software, Any-

Software

Word Processing/ Desktop Publishing	
Ami*	\$ 99
Lotus Manuscript	\$339
Microsoft Word	\$229
Multimate Advantage II	\$269
Office Writer/Spell	\$259
Pagemaker 3.0	\$499
PFS:Professional Write	\$119
Publisher's Type Foundry	\$249
SPF/PC	\$159
Sprint	\$129
Ventura Publisher	\$469
WordPerfect 5.0	\$229
Wordstar Pro 5.0	\$249
Wordstar 2000+ 3.0	\$259
Xywrite III Plus	\$219

Database Systems

Clipper	\$449
DBase IV	\$479
DBase IV Devel. Edition	\$799
Database 4.0	\$449
DataPerfect	\$309
Foxbase Plus	\$189
Paradox 2	\$479
PFS:Professional File	\$179
R Base for DOS	\$469

Spreadsheets/ Integrated Packages

Allways	\$ 89
Lotus 1-2-3	\$309
Lotus Agenda	\$269
Lotus Hal	\$ 99
Lucid 3-D	\$ 79
Microsoft Excel	\$259
Microsoft Works	\$109
Q&A	\$209
Quattro	\$149
Smart System	\$449
Supercalc 5	\$329
Lotus Symphony	\$459

Communications

Carbon Copy +	\$119
Crosstalk XVI	\$ 99
Crosstalk MK4	\$125
Procomm Plus	\$ 59
Relay Gold	\$169
Smartarm (Parsoft)	call
Smartcom III	\$149

Statistics

CSS 2.1 with graphics	\$369
SPSS/PC+	\$675
Statgraphics 3.0	\$569
Systat 4.0 w/ Sygraph	\$519/679

Desktop Environments

MS Windows 286	\$ 69
Sidekick Plus	\$129

Graphics

Design CAD	\$159
Diagram	\$259
Lotus Freelance Plus	\$329
Gem/3 Presentation	\$289
Generic CADD III	\$139
Graph Plus	\$319
Master Graphics	\$299
Micrograph Designer	\$449
Harvard Graphics	\$279
MS Chart	\$269
PC Paintbrush Plus	\$ 79
Picture Perfect	\$199
Publishers Paintbrush	\$149
Project Management	
Adv.Proj.Mgr. Wkbench	\$819
Harvard Total P.M.II	\$429
Microsoft Project 4.0	\$329
Superproject Expert	\$449
Timeline 3.0	\$389

Languages/Utilities

Fastback Plus	\$105
Norton Advanced	\$ 79
Microsoft C	\$299
Mace Utilities	\$ 65
MS Fortran 4.0	\$299
Quick Basic/Quick C	\$ 89
Turbo Basic	\$ 65
Turbo Pascal 5.0/ Turbo C	\$ 99
Turbo Pascal Prof/C Prof	\$169
Vaccine (anti-virus)	\$ 99

Accounting

DacEasy	\$ 89
Great Plains	\$499
Peachtree Complete III	\$159

Hardware*

Computers	
AST Premium 286-080	\$1475
Samsung 5550 40MB w/EGA card	\$1750
Toshiba T1600 laptop	\$3750

Multifunction Boards

AST 6 Pak Plus (64k)	\$ 129
Advantage 286 (512k)	\$ 375
Rampage + 286 (512k)	\$ 519
Rampage + MC (512k)	\$ 519
Inboard 386AT	\$1129
Inboard 386PC	\$ 775
Intel AboveBoard Plus	\$ 439

Display Boards

AST VGA	\$ 259
AST VGA Plus	\$ 349
ATI EGA Wonder x 800	\$ 259
Paradise VGA Plus	\$ 289

Modems

Hayes 1200/1200B	\$ 299
Hayes 2400/2400B	\$ 449
Intel 2400B/2 (PS/2)	\$ 279
Practical 1200 Internal	\$ 79
US Robotics 2400B	\$ 159
Ventel 2400/2400B	\$ 389
Ventel 2400/2 (PS/2)	\$ 299

Networking

Arcnet Adv. SMC	\$ 149
Novell Adv. Network 286 2.12	\$1950
Novell ELS Level I	\$ 450
Tops for DOS	\$ 119

Emulation Boards

AST 5251-11+	\$ 575
IRMA II PCA/MCA	\$ 725

Monitors

Amdek 410A	\$ 149
AST EGA Display	\$ 489
AST VGA Display	\$ 489
NEC Multisync II	\$ 829
Princeton HX-12 +	\$ 439
Samsung Color	\$ 239
Samsung Monochrome	\$ 89

Printers/Plotters

Epson FX-1050	\$ 529
Epson LQ-500	\$ 379
Epson LQ-1050	\$ 829
Epson LQ-2550	\$1050
H-P 7475A Plotter	\$1475
H-P Deskjet	\$ 750
H-P Laserjet II	\$1795
Okidata 320	\$ 375
Okidata 321	\$ 519
Okidata 393	\$1050
Panasonic 1080i	\$ 199
Panasonic 1091i	\$ 229
Panasonic 1124	\$ 339
Toshiba printers	call

Mass Storage/Backup

Bernoulli II Dual	\$1750
Irwin Tape drives	call
Mountain 40MB	
Int. Tape	\$ 389
Plus Hardcard 20	\$ 525
Plus Hardcard 40	\$ 669
Seagate ST225-1	\$ 489
Seagate ST225 w/int.	\$ 289
Seagate ST238 w/int.	\$ 319
Sysgen Bridge w/int.	\$ 299

Input Devices

Complete Hand Scanner	\$ 169
Keytronics KB101	
keybrd	\$ 99
Logitech Hi-Res Mouse	\$ 99
Logitech ScanMan	\$ 199
Microsoft Mouse	\$ 109
PC Mouse w/Paint	\$ 99

Accessories

Curtis Ruby	\$ 59
Datashield S-100	\$ 69
Isobar 4-4	\$ 49
Logical Connection (256k)	\$ 499
Masterpiece Plus	\$ 125
256k Ram set	call
8087 math chip	\$ 119
80287-8/80287-10	\$259/299
80387-16/80387-20	\$459/519

*Call for shipping cost

ATTENTION CORPORATE BUYERS:

FAXPEDIT! FACSIMILE ORDER SYSTEM
(718) 438-2315 or (718) 972-8346

Your Corporate Purchase Order is guaranteed priority handling when you "fax" it in via our exclusive SOFTLINE FAXPEDIT service. Inquiries, RFP's and other communications will also receive prompt attention.

ATTENTION INTERNATIONAL BUYERS:

TELPEDITE! GLOBAL ORDER SYSTEM
627-30170 or 910-240-3918
Int'l. Fax lines (718) 438-2315 or 972-8346

SOFTLINE TELXPEDITE insures prompt response for all your orders and inquiries. Payments may be made by bank check, wire transfer, Mastercard or Visa. Goods are shipped via Air Mail (recommended for small orders) or Air Freight. Add freight costs to prepayment, or goods are shipped freight collect.

Celebrating 6 Years of Service

1-800-221-1260

Customer service hours: 9am - 5PM EST Mon.-Fri.

In New York State and Int'l. Call (718) 438-6057

FREE SHIPPING on all orders over \$1000, credit card and prepaid orders.



Softline

1333 60th Street
Brooklyn, NY 11219
TELEX: 627-30170 or 910-240-3918
FAX: (718) 438-2315

where...

Softline

Delivers!

PC
MAGAZINE

**EDITOR'S
CHOICE**

winners at super low prices!

XYWRITE III +



\$219
(2/29/88)

PARADOX



\$479
(3/17/87)

FOXBASE PLUS



\$189
(3/17/87)

VENTURA PUBLISHER



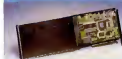
\$469
(10/13/87)

HP LASERJET II



\$1695
(11/13/87) mscc

+ HARDCARD



20 Meg - **\$525**
40 Meg - **\$669**
(12/8/87)

FREE TEE!



Ask for one of these great **PC MAGAZINE** tee shirts when you place your order.
A \$10 value, it's **FREE** with your order of \$500 or more, while supplies last!

AST PREMIUM



286 Model 80
\$1475
(1/12/88)

HARVARD GRAPHICS



\$279
(9/27/88)

1-800-221-1260

Softline

1333 60th Street
Brooklyn, NY 11219
TELEX: 627-30170 or 910-240-3916
FAX: (718) 438-2315

TERMS: All returns require prior authorization • 20% restocking fee on returns • PO's accepted from qualified organizations • Visa or Mastercard add 3% • C.O.D. Cash, Money order or bank check only • add \$5.00 per order
Prepaid company or personal check - allow 2 weeks to clear • Shipping via UPS surface - add \$3.00 per item, UPS Blue - add \$12 per item • All prices subject to change, call for current prices • int'l - freight additional

Introducing the world's first cellular computer.



Now cellular communication is more than just talk.

Get all the power of portable computing and the convenience of cellular communications too. Meet the ITC 286 CAT from Intelligence Technology Corporation. It's two technologies in one efficient package, ready to work at a remote jobsite or an office downtown.

This unique patented portable offers fail-safe transmission. The built-in cellular telephone and error-correcting modem let you trust valuable data to the cellular network — even during hand-off and channel changes.

And it provides more than 2 hours of battery-powered operation, automatically converting to 110/220V or to 12V for in-vehicle use. Batteries can even be recharged during operation.

The ITC 286 CAT is IBM PC/AT-compatible and features 12 MHz processing, 640K memory,

a high-speed hard disk drive, a high-resolution EGA screen, full-size keyboard and more. The numeric keypad and built-in speakerphone simplify your voice and data calls. A headset and cellular telephone handset are included for more versatility. And it all comes in an easy-to-carry case.

For a complete workstation just take along a portable printer. Or connect with other ITC 286 CATs for an instant mobile LAN. It's a brand new way to keep your company on the move.

If you thought cellular communications was all just a lot of talk, we invite you to hear and see more about this technological merger. ITC made a remote possibility reality. For details call: 1-800-356-3493.



Intelligence Technology Corporation

16526 Westgrove, Dallas, TX 75248 U.S.A.
214-250-4277, FAX 214-380-0508



LETTERS

THE MISSING AMERICAN

I am very surprised at your choice of top desktop system ("5th Annual Awards for Technical Excellence," *PC Magazine*, January 17, 1989). I do not think that the ALR cache technology was sufficiently unique to rate first place. More importantly, the Wells American CompuStar was completely ignored in the runners up categories.

The Wells modular system is a quantum leap in hardware refinement, taking removable backplane technology in desktop publishing to its logical conclusion. The Wells American organization is just that—American—and deserves all our support for their innovative approach and high-quality output.

Bill Copenhagen
Richmond, California

SMART MONEY

I have to question how closely Donald Trivette evaluated all three products before he chose *MoneyMate* to be the "real star"

PC Magazine is a constant source of helpful information. The only addition I can think of would be a swimsuit issue.

and "buy" of the three personal finance packages reviewed in *After Hours*, *PC Magazine*, December 27, 1988. I have used *Home Finance System III* since its introduction and consider it a smart software system that uses fast assembly language to incorporate unique design features that were not even mentioned.

Roy H. Andrew
Lake Ronkonkoma, New York

THANKS FOR EVERYTHING

I would like to thank everyone at *PC Magazine* and *PC MagNet* for their wonderful magazine and BBS. *PC Magazine* is a constant source of helpful information. The only addition I can possibly think of would be a swimsuit issue.

John Rago, Jr.
Moccasin, California

BUT DOES IT RUN OS/2?

I was very disappointed that your review of 286 machines ("The 80286: Unsafe at Higher Speeds?" *PC Magazine*, December 27, 1988) didn't test for OS/2 compatibility. Why was this claim not tested? It's a make-or-break point for me, as I would not invest in a machine that didn't run OS/2.

Andy Klein
Glendale, Arizona

I NEED MY SPACE

For many of your readers, *PFS:First Choice* is the last choice ("The Best of 1988"). I do my work on a Zenith laptop with no hard disk, and I find that the size of *First Choice* gets in the way of its use. With its .EXE file as well as all the overlays, the program requires two disks exclusive of data files. For now, I'll stick to *Microsoft Works* for my integrated program because it's functional and fits on one 720K disk with its spelling checker.

Richard B. Thomas
Tacoma, Washington

CORRECTIONS/AMPLIFICATIONS

The new Intel 80386SX processor is 16 MHz, not 12 MHz ("Take It or Leave It: Portables with Desktop Power," *PC Magazine*, October 11, 1988).

HOW TO WRITE TO PC MAGAZINE

Send letters to *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to *PC MagNet* (see the Productivity section for access information). All letters become the property of *PC Magazine* and are subject to editing.

See Us At Comdex! Booth 8551

Can't Afford A PostScript® Printer?

for only \$ **195**

NOW YOU CAN Print PostScript Language Text and Graphics On almost ANY Printer



GoScript Software, the Low-Cost PostScript Language Printing Solution

Choose the one that fits YOUR needs:

GoScript - \$195 - With 13 Fonts!
GoScript Plus - \$395 - With 35 Fonts!

Both include our High Quality, Scalable Outline Fonts

*Includes Drivers for: NEC Pinwriter; HP LaserJet, DeskJet, PaintJet; Canon LBP-8II, BubbleJet BJ130; Epson LQ and FX; Toshiba 24-Pin; Fujitsu DL 24-Pin; Panasonic KX 24-Pin; IBM ProPrinter, Quickwriter, Quietwriter

ORDER TODAY!
Contact Your Local Dealer

or call the LaserGo Order Line
(800) 451-0088 (outside Calif.)

In Canada, Contact CDP Communications, Toronto, ON, TEL. (416) 323-9666 FAX. (416) 323-3678
Exclusive European Distributors: Graphic Sciences Ltd., Surrey, England, TEL. (01) 940-9480 FAX. (01) 948-2851

LaserGo, Inc
TEL: (619) 530-2400
FAX: (619) 530-0099

9235 Trade Place, Suite A, San Diego, CA 92126
LaserGo Software is a registered trademark of LaserGo, Inc. All other product names are trademarks of their manufacturers.

CIRCLE 280 ON READER SERVICE CARD

THE POWER IS UP THE PRICE IS DOWN!

 **Swan 386/20D**

\$2199

Monitor not included

Base System with 1.2MB 5.25" or 1.44MB 3.5" Drive
Assembled & Tested IBM® AT
Compatible, MS-DOS®, OS/2®
& UNIX® Compatible

STANDARD FEATURES

- 80386-20 MHz
- NORTON V. 4.0 SI 22
- 0 WAIT STATE
- PHOENIX BIOS
- 1MB EXPANDABLE TO 16MB
RAM ON 32-BIT CARD
- SHADOW RAM FOR SPEED

- 80287 AND 80387 SOCKETS
- 200 WATT POWER SUPPLY
- 2 SERIAL, 1 PARALLEL AND
1 GAME PORT
- 8 EXPANSION SLOTS
- DUAL FLOPPY/HARD DRIVE
CONTROLLER
- CLOCK CALENDAR WITH
BATTERY BACKUP

386/20D

VIDEO OPTIONS

Drive Options	Mono	14" Flat Mono	VGA Mono	VGA Color
w/40MB (40ms) Hard Drive	\$2749	\$2798	\$2948	\$3248
w/80MB (28ms) Hard Drive	\$3049	\$3098	\$3248	\$3548
w/150MB (17ms) ESD w/1:1 Interface	\$3794	\$3843	\$3993	\$4293

- 5 DEVICE BAYS, 3 EXPOSED
- 101 KEY ENHANCED
KEYBOARD
- SWAN SETUP AND UTILITIES
DISKETTE

CALL
TOLL FREE **1-800-468-9044**

Swan MODEMS

Swan VIDEO CARDS

Swan TAPE BACKUPS

Swan KEYBOARDS



- Hayes® compatible
- Auto answer/dial
- Tone and Pulse

Include PC Talk III Software

2400 bd internal ...\$129

1200 bd internal ...\$69

2400 bd external ...\$149

1200 bd external ...\$99

* Includes Bit Com v 3.5 software

5-PMD1



Switchable

- Hercules® to CGA
- Parallel Port\$69

EGA

- EGA/CGA/TTL
- 640 x 480
- Parallel Port\$149

VGA

- 256K Video RAM
- 17 VGA Modes\$249



- 40MB formatted storage
- QIC-40 Operating Std.
- Network compatible

40MB XT or AT

Internal\$299

40MB XT or AT

External\$399



101 key Enhanced Keyboard

■ XT & AT compatible\$69

84 key Keyboard

■ XT & AT compatible\$59



ALL SWAN

PRODUCTS

CARRY A

FULL 1 YEAR WARRANTY

ON PARTS AND LABOR.



Swan Technologies

Assembled by **TUSSEY COMPUTER PRODUCTS**

Swan 286/10

Swan Technologies

LOVE 'EM or LEAVE 'EM!

30 DAY MONEY BACK GUARANTEE
It's obvious our prices are lovable. But we make this guarantee because we know you'll also love our...

- Quality Products
- Toll Free Technical Support
- Toll Free Customer Service
- Same Day Shipping
- 1 Yr. Warranty on Parts & Labor

CALL TOLL FREE **1-800-468-9044**



Swan 386/16

\$1999 Monitor not included

Base System with 5.25" 1.2MB Drive
Assembled & Tested IBM AT Compatible
MS-DOS[®], OS/2[®] & UNIX[®] Compatible

386/16	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
Drive Options	Mono	16" Flat	VGA	Color
w/40MB (40MB) Hard Drive	\$2549	\$2599	\$2749	\$3049
w/80MB (80MB) Hard Drive	\$2849	\$2899	\$3049	\$3349
w/150MB (150MB) Hard Drive	\$3399	\$3449	\$3599	\$3899

Swan XT10

\$549 Monitor not included

Base System with Single 360K Drive
Assembled & Tested IBM XT Compatible

XT10	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
Drive Options	Mono*	CGA	EGA	VGA
Dual Floppies	\$779	\$949	\$1179	\$1279
w/20MB (20MB) Hard Drive	\$979	\$1149	\$1379	\$1479
w/12MB (40MB) Hard Drive	\$979	\$1149	\$1379	\$1479

* Includes Single 360K Floppy Drive
* Upgrade from 12" to 14" Flat Screen, add \$49

Swan 286/10

\$999 Monitor not included

Base System with 1.2MB Drive
Assembled & Tested IBM AT Compatible
MS-DOS[®], OS/2[®] Compatible

286/10	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
Drive Options	Mono*	CGA	EGA	VGA
w/20MB (20MB) Hard Drive	\$1399	\$1569	\$1799	\$1899
w/40MB (40MB) Hard Drive	\$1549	\$1719	\$1949	\$2049
w/80MB (80MB) Hard Drive	\$1849	\$2019	\$2249	\$2349

* Upgrade from 12" to 14" Flat Screen, add \$49

Swan 286/12

\$1099 Monitor not included

Base System with 1.2MB Drive
Assembled & Tested IBM AT Compatible
MS-DOS[®], OS/2[®] Compatible

286/12	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
Drive Options	Mono	14" Flat	EGA	VGA
w/40MB (40MB) Hard Drive	\$1649	\$1699	\$2049	\$2149
w/80MB (80MB) Hard Drive	\$1849	\$1899	\$2249	\$2349

XT, AT and OS/2 are registered trademarks of International Business Machines
MS-DOS is a registered trademark of Microsoft Corporation

Swan 386/20T

\$2499 Monitor not included

Base System with 5.25" 1.2MB Drive
Assembled & Tested IBM AT Compatible
MS-DOS[®], OS/2[®] & UNIX[®] Compatible

386/20T	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
Drive Options	Mono	16" Flat	VGA	Color
w/40MB (40MB) Hard Drive	\$3049	\$3099	\$3249	\$3549
w/80MB (80MB) Hard Drive	\$3349	\$3399	\$3549	\$3849
w/150MB (150MB) Hard Drive	\$4099	\$4149	\$4299	\$4599

To order: No surcharge on Discover, Visa, MasterCard or AMEX. ■ Your credit card is not charged until your order is shipped. ■ COD orders accepted with no COD fee. ■ We insure your order at no extra cost to you. Shipping: \$19.95 minimum for UPS Ground. Call for shipping charges on Express Air, APO, FPO, AK, HI and all foreign orders. Mail Orders: We accept money orders, certified checks, and personal checks. Allow 2 weeks for personal and company checks to clear. ■ Defective items replaced or repaired at our discretion. ■ PA deliveries add 6% sales tax. ■ Prices and terms subject to change without notice. ■ We accept purchase orders from qualified Educational & Corporate institutions.



OPEN: 8:00 AM - 11:00 PM M-F
10:00 AM - 8:00 PM Sat
12:00 PM - 8:00 PM Sun

Tussey Computer Products
3075 Research Dr.
State College, PA 16801

SAFARI

tcp

NOW AVAILABLE!

On-Site Service from
Sorbus™
A Bell Atlantic Company
Call for Details

EDUCATIONAL & CORPORATE ACCOUNTS

We offer a full line of services catering to your needs.
To reach our Educational & Corporate Sales Department
Call: 1-800-468-9044
FAX: 814-237-4450

We cooperate with Federal Authorities to prosecute credit card frauds.

Standard Features	XT10	286/10	286/12	386/16	386/20D
CPU	8086-1	80286	80286	80386	80386
Speed (MHz)	10/4.7	10/6	12/6	16/6	20/6
BIOS	Phoenix	Phoenix	Phoenix	Phoenix	Phoenix
Norton SI Rating v.4.0	2.1	11.2	13.7	17.6	22.0
Wait State	0	0	0	0	0
Standard Memory	640K	512K	512K	1MB	1MB
Shadow BIOS	---	---	---	384K	384K
Memory Upgrades	---	540K/1MB	1MB	1.44/1.5/1.6MB	2.44/1.5/1.6MB
Coprocessor Support	8087	80287	80287	80287 or 80387	80287 or 80387
Expansion Slots: 32-bit	---	---	---	1	1
Expansion Slots: 16-bit	---	8	6	4	4
Expansion Slots: 8-bit	8	2	2	3	3
Dual HD/FD Controller	with 2 systems	Yes	Yes	Yes	Yes
Device Bays (floppy/serial)	2 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.
Serial Ports	1	1	1	1	2
Additional I/O Ports	All come with 1 Parallel and 1 Game Port				
Power Supply	150W	200W	200W	200W	200W
Keyboard	101 Key	101 Key	101 Key	101 Key	101 Key
Additional Features	All come with Clock Calendar w/Battery Backup and Setup/Utilities Disk				
OPTIONS:	XT10	286/10	286/12	386/16	386/20D
3.5" Floppy Drive	Optional	Optional	Optional	Your choice	Your choice

Swan/MS-DOS & GW BASIC 3.3 add \$89

INTERNATIONAL CALL 814-234-2238
FAX: 814-237-4450 CIRCLE 530 ON READER SERVICE CARD

TUSSEY COMPUTER PRODUCTS

Not just another power trip.

The IBM PS/2 Model 70 386 with Micro Channel.

A desktop system with 386 power, loaded with memory, racing through complex applications at up to 25 MHz, is where the Personal System/2[®] Model 70 386 *begins*.

What it offers you beyond its sheer power, is where it begins to make a difference.

Model 70 386			
Available models	A21	SP	285
Microprocessor	80386 25 MHz, 8400 memory cache (20ns)	80386 25 MHz	80386 16 MHz
Optional Math Co-Processor	80387 25 MHz	80387 25 MHz	80387 16 MHz
Memory (RAM) (Standard) Maximum on system board System maximum	2Mb (80ns) 64K 16Mb	2Mb (85ns) 64K 16Mb	1Mb (100ns) 64K 16Mb
Diskette storage	1.44Mb 3.5-inch standard (2 maximum).		
Fixed disk storage	10Mb (20ms) 100Mb (20ms) 50Mb (20ms)		
Built-in features	Video Graphics Array (VGA) and display port diskette controller, serial, parallel, keyboard and pointing device ports, clock/calendar		
System expansion	Three option slots (two 32-bit, one 16-bit)		
Operating systems	DOS 3.3 4.0, IBM OS/2, AIX [™] PS/2		

The Model 70 386 features Micro Channel,[™] a 32-bit bus created to take full advantage of 386 technology. Micro Channel is designed for multitasking and multiprocessing. It allows the PS/2[®] to operate several intelligent processors and subsystems simultaneously. So you can do several jobs at once and still get truly balanced performance.

With the Model 70 386, complex spreadsheets go faster than ever. So do sophisticated graphics. Even networking is no sweat. And Micro Channel ensures a platform for future applications, such as imaging and advanced communications.

By combining Very Large-Scale Integration, advanced Surface Mount Technology and built-in features, PS/2s deliver state-of-the-art reliability and design sophistication. The Model 70 386 runs most current DOS applications and is ideal for the new OS/2[®] applications.

Here, then, is a system that recognizes your need for power today, and helps protect your investment for years into the future. All at a price you'd expect to pay for 386 machines with "yesterday's" bus architecture.

For a demonstration of the PS/2 Model 70 386, see your nearest IBM Authorized Dealer or IBM marketing representative. Call 1 800 IBM-2468, ext. 119 for a dealer near you.

It'll be well worth the trip.




IBM

IF ANYONE TELLS YOU THEIR MOUSE OUT-PERFORMS MITSUBISHI'S, THEY'RE SLIPPING YOU A MICKEY



We proudly present three reasons why Mitsubishi will soon be the mouse you'll see scampering across more and more desktops: **E-Mouse**, **M-Mouse** and **S-Mouse**.

These fast-moving, versatile mice are now showing up in every field in America. And with good reason. Because Mitsubishi understands the importance of building a mouse that meets the user's standards of speed, comfort and reliability across a range of DPI requirements. And with that in mind, we built three mice designed to provide you with performance that you can rely on time and time again.

 **E-Mouse: the only 400 DPI serial mouse available.**

Combining microprocessor technology with super precise optomechanical technology,

E-Mouse provides you with the highest possible resolution even in a serial mouse—400 DPI. What's more, you can connect it directly to your PC's serial port without opening your machine and using up valuable expansion slots. Just plug it in and go! And **E-Mouse** is completely Microsoft® compatible too. Its 15 pop-up menus let you control cursor movements even in applications that don't usually support mouse devices.

M-Mouse: luxury features at a 200 DPI price — The Industry Standard.

Designed for a wide range of applications, the 200 DPI **M-Mouse**



is completely compatible with all IBM or IBM-compatible PCs with serial ports. It features a rugged, two-button dual control system that uses reliable optomechanical encoding and single chip control circuitry. Best of all, **M-Mouse** fits comfortably in your hand and scoots along on Teflon™ feet and a silicon coated ball for incomparable movement response. No external power or special pads are ever required.

S-Mouse: the only 200-800 DPI variable resolution, hardware-driven mouse available.

For the first time ever, Mitsubishi offers a new-generation mouse that provides exponential tracking from 200 to 800 DPI. Armed with a self-contained microprocessor control, **S-Mouse** can go from 10 to 13.8 inches per second with just a flick of your wrist. It's perfect for window environments, graphics, desk top publishing operations and any other applications that require high resolution graphics and use today's new larger CRTs. And like all other Mitsubishi mouse devices, **S-Mouse** is comfort-designed for hours of fatigue-free operation.

Each mouse device can be purchased stand-alone, or bundled with any of the following programs:

Drafix/CAD, EGA Paint 2005



To order or to find out more about Mitsubishi mouse devices, call toll-free:
1-800-232-5727

Dealer inquiries welcome too — call (212) 605-2607.

Mitsubishi International Corporation
Hi-Tech Components & Plastic Company
100 Manhattan Avenue, Suite 100, New York, NY 10038

■ JOE DESPOSITO



PC ADVISOR

Help in finding software to beef up a laptop cursor, locating an inexpensive black-and-white monitor, filling a need for voice mail telemarketing, and upgrading from XT to AT.

THE CASE OF THE LOST CURSOR

I am looking for a way to change the default cursor style on my Zenith SupersPort 286. The cursor blink rate is fairly close to the LCD response time, so the cursor stays very faint. I would like to change it to a solid block cursor or slow down the blink rate, anything but what I have right now. The problem is exacerbated when I am using a word processor or spreadsheet. The cursor gets totally lost in the clutter. Do you know of any way to get around this problem?

Gopal Miglani
Des Moines, Iowa

A product called No-Squint Laptop Cursor from SkiSoft Publishing (1644 Massachusetts Ave., Lexington, MA 02173; (617) 863-1876) can help you with your problem. This \$39.95 utility was reviewed in First Looks, page 56, PC Magazine, December 13, 1988.

BLACK, WHITE, AND READ ALL OVER

Can you please tell me how to get an IBM PC and/or AT clone to display black text on a white background without getting into the desktop publishing business? I just want my wife's plain-vanilla (and somewhat obsolete) word processor to put black text on a white screen (like ink on paper). Surely there is a video card/monitor combination that will do this. (I know about using ANSI.SYS to give inverse video. That works fine as long as you're in DOS.) I'd appreciate any suggestions you can offer.

Jerry D. Robertson
Signal Mountain, Tennessee

In the March 29, 1988, issue of PC Magazine, there was an article entitled "Black-and-White Monitors: The Designer Collection." Of the 14 monitors reviewed, most (13) were for people with serious desktop publishing concerns. The cost of these monitors (or monitor/video board combinations) ranged from \$999 to \$2,620. From what you say in your letter, I don't believe any of these products are what you are looking for.

One product in that roundup, the NEC MultiSync GS, from NEC Home Electronics (1255 Michael Dr., Wood Dale, IL 60191; (312) 860-9500), received the comment "is clearly out of its league among these high-resolution giants," but it seems to fit your needs perfectly. It will give you the black text on a white background that you are looking for and will work with any IBM graphics adapter, from CGA to VGA (and Hercules graphics, too). Considering the suggested retail

price of just \$279, this is an economical way to get the display you want without asking your wife to switch to a word processor that allows control of background and foreground colors.

VOICE MAIL TELEMARKETING

Are you aware of any products that can perform the following operation (or something similar)? A customer in need of pricing information places a telephone call to a business. A PC answers the call with a recorded message that prompts the caller for a product part number. The caller enters the part number via a touch-tone telephone. The PC references a dBASE III Plus database file to locate the price and verbally relays the price to the caller.

David C. Perry
Wilmington, Delaware

In the January 17, 1989, issue of PC Magazine, there was an article entitled "Replacing the Receptionist: PC-based Voice Mail Systems." Of the nine products reviewed, three are capable of inbound telemarketing, which is the application that you are describing. An inbound telemarketing feature means that a voice mail product can prompt users, record messages (typically in the form of orders), and dispense information.

Of the three products, two are for single-line systems and one is for multiple-line systems. For single-line systems there are BigMouth from Talking Technology (4383 Piedmont Ave., Suite B, Oakland, CA 94611; (415) 652-9600) at a suggested retail price of \$269, and Watson from Nat-

■ Can you please tell me how to get a PC to display black text on a white background without getting into the desktop publishing business?

■ PC ADVISOR

ural Microsystems (8 Erie Dr., Natick, MA 01760; (617) 655-0700) at a suggested retail price of \$199. For multiline systems there is VBX System, also from Natural Microsystems, at a suggested retail price of \$3,995.

To do what you want to do with the system, you'll have to do some programming. For example, Talking Technology sells a Programmer's Development Package, which you can use to tailor the operation of BigMouth to your specific needs. The package will work in conjunction with any language that can call a software interrupt, such as BASIC, C, Pascal, and assembler. This toolkit costs \$79 (\$339 when purchased with BigMouth). Additionally, if you are not an accomplished programmer, Talking Technology sells The Interpreter, a proprietary language that makes it easier to develop custom applications. The Interpreter costs another \$79 (or \$399 for all three).

NOT LEAVING THE PAST BEHIND

I own an IBM PC-XT clone that has 640K of memory, CGA board, game port, serial port, 2,400-bit-per-second internal modem, two 5¼-inch floppy disk drives, and a Seagate ST138R hard disk drive. My question is, since I want to upgrade to an AT, what hardware will I be able to salvage from my current system? I would also like to know if my current RAM chips would be usable in an AT motherboard, and can 8-bit add-on cards be plugged into 16-bit slots?

Joseph Baccellieri
State Island, New York

Since the IBM AT bus is an extension of the IBM PC-XT bus, 8-bit boards usually work fine when used in an AT. Therefore, your CGA board, ports, and modem should all work in the AT. The Seagate ST138R will work in the AT, and most XT hard disk controllers will work, too, but

the penalty you pay is slow performance. If the controller works, your floppy disks will work, too.

As for the RAM chips, 150-nanosecond chips should be used only in ATs that work at speeds of 8 MHz or slower. If you are upgrading to 10 or 12 MHz, the chips will not be fast enough. Your best bet is to purchase 100-ns. chips. Also, your XT motherboard may have some 64K chips and your AT board may require 256K chips.

The only other problem you may have is with the keyboard. If your keyboard is one of the switchable types, just switch to the AT setting and the keyboard should work fine. Otherwise, you'll need a new one.

ASK THE ADVISOR

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016, or upload to PC MagNet (see the Productivity section for access information). Please specify your equipment. ☐

Travel Companions.



The WorldPort 2400™ and the WorldPort 1200™ modems are the perfect travel companions for your portable computer. They work virtually anywhere in the world, including hotel rooms and phone booths, allowing you to connect in a few million more locations than other modems.

With features superior to internal units, the WorldPort line of modems is the smart choice for all your communication needs. WorldPort modems operate from their own internal battery,

drawing no power from your laptop. Cutting edge technology brings you features such as Bell and CCITT standards, direct connect and acoustic interface (300 and 1200 bps), tiny size and a tiny price. The WorldPort 1200™ can be easily upgraded to 2400 bps and both the WorldPort 2400™ and the upgrade come with Carbon Copy PLUS™ communications software.

Find out more about the travel companions that won't tie down your portable computer. Call us

today for more information about the WorldPort line of modems, or the name of your nearest dealer, at 800-541-0345. (In New York, 516-261-0423.)



Touchbase Systems, Inc.
160 Laurel Avenue
Northport, NY 11768
(516) 261-0423
TELE: 6502848020
FAX: (516) 754-3481

WorldPort 1200 and WorldPort 2400 are trademarks of Touchbase Systems, Inc.. Carbon Copy PLUS is a trademark of Meridian Technology Inc.

CIRCLE 231 ON READER SERVICE CARD

Nobody can beat our performance.

Imagine being able to get ALR's 25MHz 80386™ FlexCache 25386 desktop system for as little as \$3,495. And imagine saving \$4,800 when you purchase the 120MB FlexCache 25386 desktop system over Compaq's® Deskpro® 386/25 model 110. Our FlexCache 120MB system delivers 10MB more ESDI disk storage at a whopping savings of 47%. All this and PC Magazine's award for Technical Excellence. Nobody can beat that.



A little less power with greater savings? ALR's FlexCache 20386DT is the answer. Priced at \$2,695, you get an astonishing savings of \$2,500 when compared to Compaq's Deskpro 386/20e. A 48% savings on the very system which "proves that you don't have to be based in Texas to build the world's fastest PCs."



And you say you want entry-level. We've got it. ALR's highly acclaimed 386/220 which was voted "Best of 1987" by PC Magazine can be purchased now for only \$1,995. Even at that price you're saving \$1,400 when you compare it to Compaq's "new" lower cost Deskpro 386s. Not only are you saving 45%, but you're getting the true 32-bit 80386 processor.



ALR
FlexCache
20 & 25386DT

\$1995.00	\$3599.00	\$2695.00	\$5199.00	\$5495.00	\$10299.00
ALR	Compaq	ALR FlexCache	Compaq	ALR FlexCache	Compaq
Model 220	Deskpro 386s	25386	Deskpro 386/25	25386	Deskpro 386/25
Model 10	Model 10	Model 10	Model 10	Model 10	Model 10
3.197 MIPs	2.489 MIPs	4.788 MIPs	4.569 MIPs	6.071 MIPs	6.50 MIPs
ALR FlexCache	Compaq	ALR FlexCache	Compaq	ALR FlexCache	Compaq
Model 220	Model 10	Model 10	Model 10	Model 10	Model 10
Model 10	Model 10	Model 10	Model 10	Model 10	Model 10

4 MB of Memory Standard

At no additional cost, the award winning FlexCache 25386 tower configuration now comes standard with double the amount of memory. With 4 megabytes, the FlexCache 25386 is equipped to outperform any fileserver in its class.

Nobody can beat

Nobody can beat our price.



Our performance and pricing keeps us rising above the competition.



With ALR you'll receive unbeatable support backed by our one-year warranty, unlimited technical support, optional on-site servicing from Intel and our worldwide network of authorized resellers. Call our toll free number today to find out more about these unbeatable systems and the name of your authorized reseller.



Advanced Logic Research, Inc.
9401 Jeronimo, Irvine, CA 92718
(714) 581-6770 FAX: (714) 581-9240

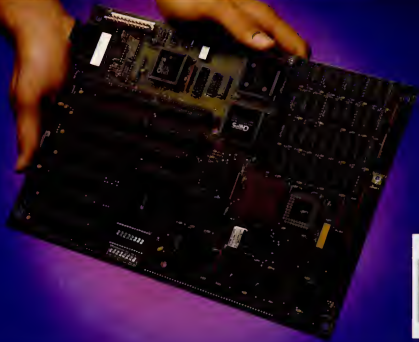
For our Canadian office: 1-800-443-4CAN
For our UK office: 1-800-444-4ALR
For our Singapore-Asia/Pacific office:
(65) 258-1286 FAX: (65) 258-1285

1-800-444-4ALR

our dealers support.

Note: Systems are shown with optional monitors

CIRCLE 493 ON READER SERVICE CARD



CONVERT YOUR PC, XT OR AT INTO A HIGHER FORM OF LIFE!

Don't let your PC give up the ghost — Hauppauge has arrived with a new spark of life: the 386 MotherBoard.™ Far more advanced than an accelerator card, our line of MotherBoards grace your PC, PC/XT, PC/AT or compatible with speeds equal to the IBM PS/2 Model 80. And faster. Because we've built in 1 Megabyte of high speed RAM and a 387 math coprocessor socket for speeds that will make your PC glad to be alive!

UNIX/386 and OS/2 Compatible. To ensure a long, fruitful life, our 386 MotherBoards are compatible with the PC/AT (BIOS and I/O) — so you can run the new generation of DOS, OS/2. Our Boards also run Windows/386, UNIX V, PC-MOS/386, and XENIX/386. For *more* power, you'll find 16-bit expansion slots that accommodate the latest I/O expansion cards. Plus, we can add up to 15 Megabytes of 32-bit extended memory. No 386 accelerator card can give you so much versatility. **Only our 386 MotherBoards give your PCs an unlimited future!**

The Critics Applaud! *PC Magazine* awarded our Board "The Editor's Choice" for 386 Replacement Boards. *PC World* called it "the Upgrade Product of the Year." And *PC Computing* said: "The 386 MotherBoard is exceptionally compatible with existing IBM applications and peripherals — it will even run IBM's own version of OS/2."

- Technical Features** • SX, 16, 20, 25, and 33MHz 80386
 • From 1 to 15 Mbyte of high speed 32-bit 4-way interleaved RAM • PC/AT compatible BIOS and I/O system for support of OS/2 and UNIX • 64K of 30 nsec static RAM cache on 25MHz and 33MHz boards • Six 8-bit expansion slots and two 16-bit expansion slots (four on 386 MotherBoard for AT)
 • One 32-bit expansion slot for up to 15 Megabytes of high speed memory.

386 MotherBoard for the PC, XT, AT and Compaq portable	.. \$1595
386 MotherBoard 20, 25 and 33MHz for the PC/AT ..	from \$1995
386 MotherBoard/SX for the mini chassis	\$1295
32-bit RAM Boards	from \$ 195
387 and Weitek coprocessors	from \$ 500
16-bit combination hard disk/floppy disk controller	\$ 175

Prices subject to change.

Our 386 MotherBoard will give your PC a new lease on life! For more information, call: **1 (800) 443-6284**. In New York: **(516) 434-1600**. All our products available at your local computer dealer. **(Ask about our GSA pricing!)**

Hauppauge Computer Works, Inc.
 175 Commerce Drive,
 Hauppauge, New York 11788
 (In West Germany, call 0211-994-320)

Hauppauge!

IBM, PC, XT, AT, PS/2 and OS/2: IBM
 Intel 386: Intel Corp. / Windows/386: Microsoft Corp.

FIRST LOOKS

SideKick for Presentation Manager: A Glimpse at Applications to Come

PC HANDS ON

BY CHARLES PETZOLD

The OS/2 Presentation Manager is off to a great start with its first available application—none other than Borland's *SideKick*. IBM is bundling *SideKick* with new copies of OS/2 1.1 and updates from OS/2 1.0. The deal is currently scheduled to extend through June.

SideKick for Presentation Manager is quite different from the DOS *SideKick*, originally released in 1984 and still one of the most popular RAM-resident pop-ups. Completely overhauled and rewritten, the Pre-



The Phonebook and Appointment Calendar of *SideKick* for Presentation Manager generate files compatible with Borland's *Paradox*.

sentation Manager version makes such a leap over the DOS *SideKick* that the two packages have little in common except for the name and concept. You'll also find none of the strange under-the-cover tricks that characterize DOS pop-ups.

Beyond Convenience

In the Presentation Manager, every program is a pop-up, so a PM program must offer more than mere convenience. The ideal PM program is interactive and easy to use but also has some powerful features that remain unobtrusive until you need them. For the most part, this is

(continues on page 35)

SuperCalc5 Mimics 1-2-3, Links And Displays Multiple Worksheets

PC HANDS ON

BY M. DAVID STONE

Most users recognize three classes of spreadsheet program: 1-2-3 as the standard, *Excel* as the leader of a new generation, and everything else. *SuperCalc5* (\$495) is Computer Associates International's latest bid to break out of the "everything else" category.

The Computer Associates strategy is simple: provide a new-generation spreadsheet that anyone familiar with 1-2-3 can use immediately, that does some things—notably graphics—even better than *Excel*, and that can be run on computers

that would be painfully slow in using *Excel*'s graphics interface. In short, with *SuperCalc5*, the battle of the new-generation spreadsheets has begun.

The laundry list of new features in *SuperCalc5* ranges from minor conveniences such as the Undo command to important new-generation features such as the ability to link spreadsheets and display multiple spreadsheets on-screen. Other features include three-dimensional graphics, a set of Audit commands for troubleshooting spreadsheets, and support for PostScript printers, cartridge-based LaserJet fonts, and multiuser operation on several networks.

One of the most notable changes in *SuperCalc5* is what Computer Associates terms coexistence with 1-2-3. In some cases this translates to stickier handling of a function that was already in *SuperCalc*. For example, where *SuperCalc4* could import and export 1-2-3 files, *SuperCalc5* can deal with .WKS and .WK1 files directly, loading them, saving them, and otherwise treating them as an alternate *SuperCalc* format. You can even set the program to use .WKS or .WK1 as the default.

In other cases, coexistence with 1-2-3 translates into a new feature that makes *SuperCalc5* easier for a 1-2-3 user to learn.

(continues on page 34)

HANDS-ON INDEX

DATA JUNCTION 2.1

A flexible approach to data files conversion 36

COMPUADD 286-20

Another voice in the 286 vs. 386 debate 38

CORE CNT-MCA

The first bus-mastering disk controller for the MCA 43

PIZZAZ PLUS

Converts color to gray scales, adds DTP file support 46

PC TOOLS DELUXE

Adds desktop accessories, format recovery 48

VTUNE

ASCII imports for Ventura Publisher 54

COREL DRAW!

Squeezes more power into fewer tools 56

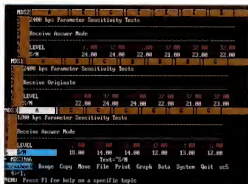
SuperCalc5

(continued from page 33)

In particular, there are the menus. By most standards, the *SuperCalc* menu structure is an improvement over 1-2-3: most commands are easier to find and require fewer keystrokes than in 1-2-3. But the need to learn a new menu structure has been a serious obstacle in getting 1-2-3 users to switch to *SuperCalc*.

Computer Associates' solution to the problem is simple—provide both choices. *SuperCalc* 5 users will find the menus they are already familiar with—along with a wealth of new options—in *SuperCalc* 5, and Lotus converts can set the program to use the menus from 1-2-3, Version 2.01. A supplied utility can convert 1-2-3 macros into macros that will work within *SuperCalc*'s 1-2-3 menus.

The one added choice on the 1-2-3 menus lets users venture



You can display up to three worksheets simultaneously with *SuperCalc* 5 and link up to 255. Above, the worksheets are shown with the optional Lotus 1-2-3-like menus.

important new feature is its ability to link spreadsheets. *SuperCalc* 5 gives you two ways to link spreadsheets. One choice is to create multiple pages within one file, with each spreadsheet on its own page. You can then

formula that defines the file and cell to read from. This approach is the obvious choice if you want to collect reports from different departments or regions, for example, and consolidate the information into a single master spreadsheet.

Another important advantage of linking multiple files is that *SuperCalc* 5 can read data not only from *SuperCalc* files, but from .WKS and .WK1 files as well. In other words, you can actually link *SuperCalc* worksheets with 1-2-3 worksheets. With the multiple file approach, you can also link an active worksheet (in memory) with worksheets on-disk. You can even combine the multifile and multipage approaches.

Whichever approach you choose, *SuperCalc* will let you link up to 255 worksheets. It will also let you view up to three worksheets at once and page through as many worksheets as you have in memory.

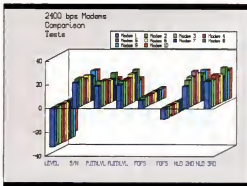
The new graphics options, including 3-D bar charts and line charts, put *SuperCalc* 5 on a level with some of the best standalone graphics packages. Even better is Computer Associates' overnight slide service (provided through MAGICorp) for converting *SuperCalc* 5 graphics images to 35mm slides.

Also noteworthy is *SuperCalc* 5's potential for printed output. With the text printer defined as a PostScript printer, you can choose from all the standard PostScript fonts. Simi-

larly, you can install the text printer as an HP LaserJet Series II and pick up to three cartridges and three soft fonts. Unfortunately, the program does not provide this level of support for all printers. With the Canon LBP-8II, for example, *SuperCalc* 5 doesn't support cartridges of soft fonts at all. Built-in graphics drivers are somewhat limited. However, *SuperCalc* can take advantage of external GCI drivers and comes with several, including some for specific PostScript printers.

Finally, there is the issue of hardware. Computer Associates is targeting the installed base of 8088 and 8086 machines, arguing that *SuperCalc* 5 is the only new-generation spreadsheet that can run at adequate speeds on older, slower computers.

True enough, but there are other good reasons for moving to *SuperCalc* 5—particularly if you're already familiar with *SuperCalc* 4 or Lotus 1-2-3 menu structures. Take a careful look. You may find that *SuperCalc* 5 is the preferred choice—even if you've already invested in a 386 machine.



SuperCalc 5 offers three-dimensional bar charts and line charts, along with an overnight service for producing 35mm slides.

into the *SuperCalc* menu system. From there, you can perform a single command and then automatically return to the 1-2-3 menus. This not only gives users a way to get at the new features not available from 1-2-3 commands, but also offers a relatively painless way to learn the *SuperCalc* menus. You also can get to the 1-2-3 menus momentarily from *SuperCalc*'s native menu system, a real frustration saver for 1-2-3 users still trying to make the change.

Aside from its coexistence with 1-2-3, *SuperCalc* 5's most

read values from one spreadsheet into another. This three-dimensional approach lets you break a complex spreadsheet model into smaller sections, which are easier to troubleshoot and can be changed without worrying about accidentally affecting the others. This arrangement also lets you load all the spreadsheets at once.

The second way to link spreadsheets is to keep each spreadsheet in its own file. When using multiple files, you can read values from one spreadsheet into another with a

PC FACT FILE

SuperCalc5

Computer Associates

International Inc.
1240 McKay Dr.
San Jose, CA 95131

(800) 531-5236

List Price: \$495; upgrades free to members of Computer Associates' SupportPlus maintenance plan, \$100 for other registered users and for registered users of competitive products.

Requires: 512K RAM (640K recommended), hard disk, DOS 3.0 or later. Not copy protected. **In Short:** *SuperCalc* 5 adds 1-2-3 compatibility, along with an abundance of expansive new-generation features, such as the ability to link as many as 255 spreadsheets and display up to three spreadsheets simultaneously.

CIRCLE 458 ON READER SERVICE CARD

SideKick

(continued from page 33)

exactly how *SideKick* for Presentation Manager has been designed.

Take the Calculator, for example. It's a nice general-purpose calculator, including trigonometric functions, financial functions (present and future values), logarithms, and exponentials. Programmers will miss hexadecimal conversions, but this is not a programmer's calculator. You can use the mouse to "press" the calculator buttons, of course, and all the buttons also have keyboard equivalents. A "paper tape" maintains a record of the calculations.

In that sense, it's just a simple, easy-to-use computer calculator. But that paper-tape display is actually a rudimentary one-column spreadsheet. You say you typed an incorrect number 40 calculations ago? No problem. Scroll back the paper tape, double-click the entry, and reenter the operation and number. The new value ripples through the subsequent calculations. You can save the tape in an ASCII format, recall old tapes, and edit them to suit your whims.

The keyboard equivalents for the Calculator keys (and much other information) is available at any time from an SAA-style context-sensitive Help window. All the *SideKick* applications have this feature. You can keep the Help window on the screen while working with the program.

Mini Paradox

The Phonebook and Time Planner are the most-sophisticated *SideKick* applications. These are actually small database applications that draw on Borland's *Paradox* technology. *SideKick* for Presentation Manager includes a 287K dynamic-link library named PDOX.DLL, described in the header section of the file as "Mini Paradox." The programs create files that can be accessed, edited, and printed by *Paradox*.

The Phonebook is easy. You select New Card from the Edit menu (or click on the New Card

icon) and type in the fields. Space is provided for a full address and for business, home, and alternative phone numbers. The entry is automatically alphabetized by last name and saved when you page to another card. By default each entry in the Phonebook occupies a full window, but you can also select a view that lists the entries one per line. You can search for a card by filling in a similar screen with selected information. As in any good database program, you can even redesign the Phonebook card layout.

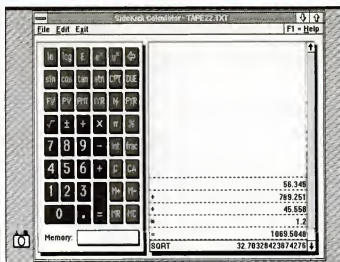
The Phonebook has an automatic dialer that works with Hayes-compatible modems. Of course, OS/2 will prevent the Phonebook from interrupting another program that may currently be using the communications port.

The Time Planner is an appointment calendar with daily, weekly, and monthly views. Setting an appointment time is a little tricky at first. This was the only part of *SideKick* that required me to consult the Help window. You can set an alarm to remind you of appointments. The alarm uses a distinctive sound and a Presentation Manager message box. The message box won't be visible outside the Presentation Manager session, but the sound is still audible.

The Time Planner also has the most gratuitous feature in *SideKick*: you can tag appointments with any of a collection of tiny icons—a ship for travel, a wineglass for a party, a flag for national holidays . . . You get the idea.

The Notepad is the weakest part of the new *SideKick*. It has a search-and-replace and uses the Presentation Manager clipboard, but that's about it. It's limited to a 64K file length. The Notepad uses a monospaced Courier font rather than the default PM proportional font, but a pesky bug in its font selection logic causes it to use a stretched-out Courier font designed for the IBM Proprinter rather than one designed for the EGA or VGA.

I found a few other problems as well. For example, all four applications have .HLP files that contain the text for their



The *SideKick* for Presentation Manager Calculator offers a "paper tape" you can scroll and edit. It automatically recalculates final values based on changes you make.

Help windows. These should be resources that are part of the .EXE files. As it stands, the programs can't find their .HLP files when loaded from a different subdirectory.

In addition, most of the .EXE and .DLL files in *SideKick* are insufficiently segmented, boosting their memory consumption. Even with 4MB of memory, expect to wait while OS/2 clears out enough memory when you load a *SideKick* application.

Finally, printing is rudimentary and doesn't use Presentation Manager facilities, so it's text-only and uses only the printer's built-in font. And you'll need to switch your PostScript printer to Diablo emulation mode or you won't get anything printed out.

I forgive Borland for these flaws, as irritating as they are. I know how much the Presentation Manager was changing in the final months of development, and I'm surprised that Borland was able to get this product out as quickly as it did.

Bottom Line

One of my first articles for *PC Magazine* was a feature review of the original *SideKick*. I liked it and used it. But a couple of years later, disgusted over the mess that had developed with RAM-resident programs under DOS, I removed *SideKick* from my system. Perhaps the simplest way to show how I feel about the Presentation Manager

version of *SideKick* is to divulge that I'm once again a happy *SideKick* user.

Of course, *SideKick* isn't the mythical "killer app" that will induce millions of users to switch from DOS to OS/2. But *SideKick* does demonstrate the power of OS/2 and the Presentation Manager and, once Borland's programmers iron out the program's few kinks, it will be even more of an asset to those who make the switch to OS/2.

PC FACT FILE

SideKick for Presentation Manager

Borland International Inc.
1800 Green Hills Rd.
P.O. Box 660001
Scotts Valley, CA 95066
(408) 438-8400

List Price: \$250; included free with IBM's OS/2 1.1.

Requires: 3MB RAM, EGA or higher, OS/2 1.1. (4MB RAM, VGA card, and mouse recommended.)

In Short: This all-new *SideKick* shows off the Presentation Manager and provides powerful functions underneath an easy interface. Includes Calculator, Phonebook, Appointment Calendar, and Notepad. Not copy protected.

CIRCLE 457 ON READER SERVICE CARD

Data Junction 2.1 Adds Intelligence to Database, Spreadsheet File Conversions

PC HANDS ON

BY CRAIG STINSON

Data Junction, Version 2.1, formerly *DataPlex*, addresses two of the data processing manager's larger headaches: the need for efficient file-format conversion and the need to ensure valid data entry.

Modeled after the airline industry's hub-and-spoke strategy, *Data Junction* provides conversions to and from the following formats: *dBASE* (II, III, and IV), *DIF*, *Lotus 1-2-3*, *Symphony*, *Paradox*, *Enable*, *FoxBASE*, *FoxBASE Plus*, *Framework* (II and III), *Multiplan*, *Reflex*, *SuperCalc*, *VP Info*, and *VP Planner*. The program also handles ASCII files in all forms (delimited, fixed, Macintosh), popular mail-merge formats (*WordPerfect*, *Microsoft Word*, *WordStar*), and mainframe and minicomputer data (EBCDIC, binary, and packed). A variety of binary numeric types is supported, including IEEE single- and double-precision floating point.

In all cases, conversion is a two-step process. Source data is first converted to an intermediate format (the *Data Junction* hub), then reconverted to the chosen output format. This approach makes *Data Junction* eminently expandable; Tools & Techniques can continue to add spokes as needs arise, without having to concern itself with the details of each possible point-to-point transfer. More important, it provides for a single interface by which to massage and filter data along the conversion path.

If users always wanted data to have exactly the same structure, content, and format on both ends of a conversion process, there'd be little need for a product like *Data Junction*. All popular database applications now provide their own simple conversion services—in and out of *dBASE* and 1-2-3, at the very least. In the real world, though,

data commonly needs a little massage in transit from one context to another. Fields may require alteration in alignment or width, some fields and records may need to be eliminated on

they are not the whole story. The hub can also serve as a data entry system, and the company has gone to great lengths to make this aspect of the program functional and flexible.

AAA	Passmore bus. office	818	795-8681
AAA	Bus. service	818	481-1235
Aaron Brothers	Glendale	818	247-6228
Abbey Medical	South Pasadena	818	577-1213
.....28	.....22	.....6	.....9

FILE 5

FRONTEND: Connect **DATAJUNCTION** Format Help Jump Library
 Modify Options Print Quit Search Transfer View Mail
 Allow Input of data into current DATAJUNCTION File
 REC: 5 of 412 FI: ALL FIELDS ALT-H for more help

Data Junction lets you edit and massage files before you complete format conversion. During data entry, it automatically recognizes data types, field widths, and validation criteria.

the output side, and new records and/or fields may need to be grafted on.

The *Data Junction* hub provides a luxurious range of messaging and filtering services. Among other things, users can add, delete, reorder, and rename fields; specify filtering criteria to eliminate unwanted records; sort records on up to four fields; change field widths and alignments; carry out search-and-replace operations; and reformat dates, times, and other common data types. To facilitate these transformations, *Data Junction* provides a simple-to-use keyboard interface (modeled after that of *Microsoft Word*) and a context-sensitive help system.

Conversion filters and masks can also be encapsulated into script files for further streamlining. And for the ultimate in automation, the input and output file types and the script file can all be named on the DOS command line or stored in a batch file.

As important as these conversion capabilities are, though,

On the input side, *Data Junction*'s Autostyle feature relieves users of the need to declare data types, field widths, and validation criteria. The program doesn't worry about widths; it simply adjusts to accommodate the widest entry in each field. As for data types, *Data Junction* looks at your first record and matches each field with one of its 48 predefined data types. Thereafter, it provides validation services to ensure that each field in each record is supplied with the appropriate kind of data.

For example, if you enter 11/16/83 into a field in record 1, *Data Junction* recognizes that information as a date. In succeeding records, you won't have to type the slashes, and you won't be allowed to enter numbers out of the appropriate ranges.

The built-in Autostyle types include all manner of dates (numeric and spelled out); postal codes for the United States, Canada, and elsewhere; Social Security numbers; telephone numbers; and many other com-

mon formats. You can add your own styles and validation criteria, and you can add field prompting as well. Or you can turn the whole Autostyle business off, if you wish.

Both in file conversion and in data entry, *Data Junction* is designed to eliminate programming. It's able to do this because it doesn't offer screen forms or structured reports. What you get is an abstract table structure with a lot of built-in intelligence.

At first blush, the hub might strike some users as being too abstract for comfort. There's nothing fancy to look at here—no screen-painting, no pull-down menus, and only the most minimal effort at color support (you can choose between white on black, white on blue, and white on gray). And for some reason, *Data Junction* displays only four records at a time, reserving a large chunk of the screen as a static message area.

But the smarts behind the screen are pretty impressive—enough so that many users who buy the product solely for conversion purposes will find themselves using it as a data entry tool as well.

All in all, the package seems more than worth its price. If you often find yourself agonizing over data file conversions, give it a try.

PC FACT FILE

Data Junction, Version 2.1

Tools & Techniques Inc.

1620 W. 12th St.

Austin, TX 78703

(512) 482-0824

(800) 444-1945

List Price: \$195

Requires: 512K RAM (640K RAM recommended), two disk drives (hard disk recommended), DOS 2.0 or later.

In Short: A hub-and-spoke system for database file conversion, equipped with an intelligent front end for entering, editing, and filtering data. Not copy protected.

CIRCLE 440 ON READER SERVICE CARD

D11:
Header Footer Data**Type** Borders Setup Pg-Length Other
Orientation, Point, LPI, Margins, Configure, Update, Install

	A	B	C	D	E
1		1980	1981	1982	1983
2	Income				
3	Advertising	180,000	125,000	150,000	175,000
4	Consulting				
5	Dealers				
6	Direct				
7	Public				
8	Shipping				
9					
10	Total Income				
11					
12	Cost of Sa				
13	Advertis				

NEW!
From the Makers of
Glyphix Fonts.

LaserJet Font Power in 1-2-3.

Print perfect spreadsheets on your LaserJet® with DataType**, the new type selection Add-In for 1-2-3.™**

Select the orientation, type size, lines per inch and the margins you want from the Data**Type** menu...Align and Go!

Data**Type** makes it easy to condense a large spreadsheet and print it sideways, or enlarge and print a range for use as an overhead. And Data**Type** doesn't get in your way. You still set headers, footers, borders and other selections directly from the 1-2-3 Print Options menu.

Introducing Data**Type**™

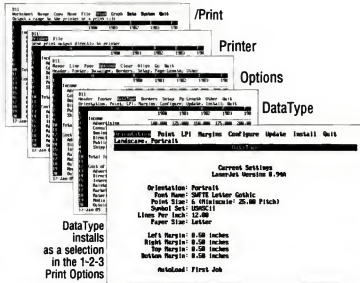
- **FOUNDRY QUALITY FONTS.** Forget about dot matrix quality type. Data**Type** includes SWiTE Letter Gothic fonts in nine sizes, ranging from 6 point (Miniscule) to 14 point (Mammoth). Print over 24,000 legible characters on a single 8.5" x 11" page.
- **AUTOMATIC PRINTER SET-UP.** No more set-up strings or macros to copy from spreadsheet to spreadsheet. Data**Type** handles printer set-up and downloading automatically. You simply select the range to print, Align and Go.
- **AUTOMATIC PAGE FORMATTING.** Select portrait or landscape. Data**Type** automatically recalculates all margin and page length settings in inches for perfectly formatted output.
- **ELIMINATE RAM CRAM.** Data**Type** uses only 10K of 1-2-3 memory, so it won't crowd even your biggest spreadsheet. And if you need to free up memory, you can load and unload Data**Type** in two keystrokes - right inside the 1-2-3 Add-In Manager.
- **IDEAL FOR NETWORKS & SHARED PRINTERS!** A shared printer will be set with your font and your margins each time you print, even if another user has changed all the printer settings.
- **INCLUDES LIC'S SYMBOLS.** Use ©, ®, ¶, •, and the rest of the Lotus International Characters Set at each point size.

/1234567890ABCD

Actual 14 point LaserJet Output using Data**Type**™

/1234567890ABCD

Actual 14 point LaserJet Output using SIDEWAYS®



NO FONT CARTRIDGE OR ADDITIONAL PRINTER MEMORY REQUIRED.



3.5" and 5.25" disks included.

ORDER TOLL FREE
800-237-9383
FAX ORDERS (302) 429-0532
IN DE. CALL (302) 429-8434



PC/808

Name _____
Company _____
Address _____
City _____ State _____
Zip _____ Tel. _____

\$89.95

Include \$5 for shipping & handling with all orders.
Make checks payable to SWiTE INT'L, LTD.

All SWiTE products carry a 30 Day MONEY BACK GUARANTEE.

SwiTE
P.O. Box 219 Rockland, DE 1932

SYSTEM REQUIREMENTS: IBM PC, AT, XT, PS/2 or compatible, a hard drive, LaserJet Plus, Series II or compatible printer. MS-DOS 2.0 or later, 1-2-3 Version 2.0 or later. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. SIDEWAYS is a trademark of Funk Software. © 1989 SWiTE International, Ltd.
† Data**Type** is licensed one per printer. Multiple users may use Data**Type** on a single shared printer.

\$1,695 CompuAdd 286-20: Yet Another Voice Enters the 286 vs. 386 Debate

PC HANDS ON

BY JONATHAN MATZKIN

The CompuAdd 286-20 PC, like all 20-MHz 286 machines, presents a dilemma to the potential buyer. The machine's performance is almost beyond criticism—it has speed and power to spare. But it's a 286-based machine in a world turning to newer 80386 technology. And in its basic configuration, the \$1,695 system is only \$200 cheaper than CompuAdd's 16-MHz 80386 machine.

A look at the results of the PC Labs benchmark tests dispels any doubts about how this well-built box performs. On the processor speed tests, the CompuAdd 286-20 screams along at two to three times the speed of an old standard 8-MHz IBM PC AT. Results from the 80286 Instruction Mix test were particularly impressive; by this measure, the 20-MHz system is fully three times faster than the original AT.

Add a fast disk to a machine with this kind of raw power, and you've got something to reckon with.

Our evaluation unit came with a monster 320MB drive that clocked in at 14.66 milliseconds on our hard disk BIOS Disk Seek benchmark test. Equipped with this big disk and VGA graphics, the system costs



The CompuAdd 286-20 is a solid, fast performer. The \$4,949 system we tested—with VGA graphics and a 320MB drive—was a power user's picnic.

\$4,949—including an authentic Harris 20-MHz 286 chip.

One anomalous result did turn up when we tested the machine's extended-memory read-and-write times. It turned in a relatively sluggish performance—actually slower than a

standard AT. That may be the result of slow switching in and out of protected mode by the Award BIOS. In any case, this can be largely overcome by shadowing the system and video BIOS into RAM.

The Award BIOS has the familiar Ctrl-Alt-Esc key sequence for BIOS configuration. I was annoyed to discover, however, that you can invoke the configuration screen only during a short period at boot-up. Miss your cue and you have to reboot.

While testing the machine, I took advantage of an optional megabyte of extended memory by installing *DESQview* and configuring the software to swap applications to a VDISK RAMdisk in extended memory.

Set up in this way, the CompuAdd 286-20 is a power user's picnic. Full-sized applications are swapped almost instantaneously, allowing rapid context switching between word processors, spreadsheets, and whatever else you are working with. We tried *XyWrite*, *Lotus 1-2-3*, *Tornado*, and several other applications, all of which ran fine. Microsoft's *Flight*

Simulator also took off without delay.

If what you want is a fire-breathing DOS machine, the CompuAdd 286-20 is a good choice. But you give up access to 80386-based software, and that's something to think about.

PC FACT FILE

CompuAdd 286-20

CompuAdd Corp.
12303 Technology Blvd.
Austin, TX 78727
(800) 666-1872

List Price: \$1,695 (with 1MB RAM, one floppy disk drive, two serial ports, one parallel port, hard disk controller).

In Short: A well-built 20-MHz 286 machine from a well-established mail-order house.

CIRCLE 442 ON READER SERVICE CARD



Benchmark Tests: CompuAdd 286-20 vs. 8-MHz IBM PC AT and Compaq Deskpro 386/20

The CompuAdd 286-20's 80286 Instruction Mix and Conventional Memory test results are on a par with other 20-MHz 286 machines, but a 14-millisecond hard disk drive makes its DOS File Access times stand out from the crowd. (See the December 27, 1988, issue for benchmark tests of 20-MHz ATs.)

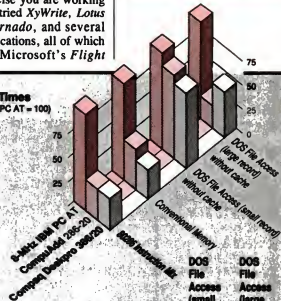
The 80286 Instruction Mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

The Conventional Memory benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The DOS File Access benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file-management functions. Five tasks—file creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.

The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

Relative Times
(8-MHz IBM PC AT = 100)



Performance Times
(Times given in seconds)

	Instruction Mix	Conventional Memory	DOS File Access (small record)	DOS File Access (large record)
8-MHz IBM PC AT	8.96	1.32	72.63	19.74
CompuAdd 286-20	2.91	0.55	63.10	4.66
Compaq Deskpro 386/20	2.91	0.40	56.78	9.34

C>ERASE *.*

Are you sure (Y/N)?_

« Data Guardian »

New Disk Optimizer gives you the courage to say yes!

Introducing Disk Optimizer 4.0. Now with Data Guardian™ and Undelete.

It's the moment of truth.

You've decided to erase an entire directory, and your computer asks, "Are you sure?"

Well? Are you? Is it the right directory? Will you ever want these files again?

Enter new Disk Optimizer 4.0 with Data Guardian. The only disk utility software that lets you blithely say "yes" now, and if you want, change your mind later. Because only Data Guardian ensures that anyone can Undelete files, directories, even entire disks. And do it hours, days, up to weeks later, no matter what else you've written to your disk in the meantime.

Best of all, Data Guardian makes file recovery quick, easy and totally fool-proof. Without the complexity of other data recovery software. And without the uncertainty. Thanks to Data Guardian, Disk Optimizer comes through for you every time.

You formatted what drive?

That's fine for erased files, you say. But what happens if you accidentally format your hard disk? No problem.

Disk Optimizer comes through again with UnFormat that can instantly restore all the data on your disk to exactly where it was before that little slip of the finger on the keyboard.

And to make sure your data is really safe, the TrackSaver feature protects the surface of your disk from excessive wear by preventing the head on your drive from spinning over the same track for too long. And the Refresh program prevents the bad spots that develop on disks due to fading magnetic changes.

Still the safest buy in performance optimizers.

As always, Disk Optimizer also gives you the safest, most advanced performance optimization available—proven by over a quarter of a million users.

The Optimize program speeds up disk reading and writing times by up to 300 percent by un-doing the file fragmentation that takes place

naturally over time. The DOConfig program lets you arrange the layout of your disk for best overall performance. And the Analyze program gives you a graphical look at the condition of your disk, so you'll always know when it's time to optimize again.

A total of 17 different programs.

Disk Optimizer includes Findfile for locating files by name or wildcard anywhere on your disk. Sorts for re-arranging files and directories in the way that makes sense to you. Lock and Unlock for password-protected file security. Killfile for erasing sensitive data permanently. And lots more.

In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance, guard your data, and make disk management easier and simpler for everyone.

So get new Disk Optimizer 4.0, and get more than the courage to say yes. Get the peace of mind and total confidence that your disk is running better and safer all the time.



 **Disk Optimizer** \$69⁹⁵

SoftLogik Solutions, Inc.
One Perimeter Road, Manchester, NH 03103.

Available at software dealers everywhere.
Or, order direct by calling toll-free.

Call 800-272-9900
(603-627-9900 in NH)

CIRCLE 334 ON READER SERVICE CARD

SOFTLOGIC
SOLUTIONS



PIPELINE

TOP TEN SELLERS — A 5-Week History

Microsoft senses weakness in Lotus's upgrade delay of Lotus 1-2-3 and has been capitalizing on it. Shipments of Microsoft Excel have never been stronger—thanks to an extensive promotional campaign that helped keep Excel in the Top Ten. Some of

the current incentives have been in place for a while, such as the full-money-back guarantee that's in effect until January 31, 1990.

In its more recent offensive, Microsoft has offered to pay \$75 to new users who can prove they switched from Lotus by surrendering their Lotus 1-2-3 master disk and sales receipt at the time they register a new copy of Microsoft Excel. In addition, the Excel sales force has been doubled, and a series of free seminars around the country has been scheduled.



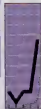
1 Lotus 1-2-3 2.01
Lotus Development Corp.



2 WordPerfect 5.0
WordPerfect Corp.



3 Quicken 2.0
Intuit



4 PC Tools Deluxe 5.0
Central Point Software



5 The Norton Utilities Advanced Edition 4.5
Peter Norton Computing



6 Value Pack
Lotus Development Corp.



7 Sideways 3.2
Funk Software Inc.



8 Fastback Plus 2.01
Fifth Generation Systems Inc.



9 TurboTax '88
ChipSoft Inc.



10 Microsoft Excel 2.10
Microsoft Corp.

READING THE CHART

The Top Ten Sellers list ranks PC business programs according to their sales totals in the week ending January 28. The chart that appears to the left of each program's name shows how the program's sales ranked each week for 5 weeks. The hash marks at the bottom of each chart represent each of those 5 weeks, beginning with the week of December 26. Dramatic shifts in a particular program's ranking may be the result of seasonal factors or sales promotions conducted by individual retailers. More than 12,000 individual locations contribute to the list.

Sales information compiled by Ingram Software Inc. and PC Connection Inc.

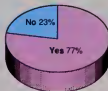


SURVEY

The last time we asked PC MagNet callers about desktop publishing, we left out graphics software. This time, we looked at the two together and found that the combination made many people go even further, thinking about their expectations for word processors that have extensive page layout features, like WordPerfect and Microsoft Word. Samna's brand-new word processor, Ami, made a few respondents' lists in the "other" category, although it didn't garner enough of the 900 responses to generate 1 percent.

The results bode well for both Aldus and Xerox, with their high-end desktop publishing programs. IBM, which is selling its Interleaf Publisher for 386 PCs only, didn't fare as well.

Do you or your company plan to purchase desktop publishing or graphics software within the next 12 months?



386SX CHIPS HEADING FOR THE SPOTLIGHT

Ever since Compaq unveiled the first 386 PC in September 1986, the trend among PC buyers has been a slowly but steadily growing preference for the more powerful of Intel's line of microprocessors. You might think Intel would want to do everything it could to help accelerate the trend. Yet Intel is now doing its best to divert the momentum away from its top-of-the-line 386.

No, Intel won't be enhancing the 8088 or 286. It's dropping the price on the 386SX (the 16-bit I/O version of the 386 that it introduced last year) in order to gain more market share for the chip. In February, Intel cut the cost of 16-MHz 386SX chips in half (from about \$165 each to roughly \$90 for bulk orders). And it's bringing two brand-new factories on-line to stamp out more chips.

Intel is hoping to highlight the greatest advantage of the 386SX—delivery of 386 features at lower cost—in order to steal some of the thunder that Harris has built up with its fast CMOS 286 chips.

Intel has had fabulous success with processors, but the SX has taken off faster than either the 286 or 386. In its first 6 months on sale, five times more SX chips were shipped than 386

in that processor's first 6 months. The SX also beat the 286 by a ten-to-one margin for the comparable launch period.

The SX price cut has some risk for Intel, since the company is often caught at the wrong end of a supply-demand curve. A year ago, Intel couldn't keep up with the strong demand for 386 chips, but now there's a glut. How-

reduced in February when a federal judge ruled that NEC could continue selling its competitive V series. The judge found that Intel had forfeited its copyrights on the 8086/88 by allowing licensed third parties to distribute chips without proper copyright notices.

Intel would like nothing better than to see the 286 become the low-end PC processor while the 386SX supplies the middle range. The company still refuses

Intel would like nothing better than to see the 286 become the low-end PC processor.

ever, Intel sees the real threat to its leadership role coming from the fast 286s. Since 386 machines, with their RAM caches and fast hard disks, tend to sell for significantly higher prices than 286 PCs and therefore don't appeal to everybody, Intel is trying to maintain dominance in both the high-end and the middle range. It's now holding on to about 65 percent of the 286 processor market and a significantly lower share of the 8-bit 8088 shipments.

The value of Intel's 8088 processor was significantly

to license production rights to either of its 32-bit chips, and since it now seems fully able to supply all the demand on its own, it's unlikely that that will change.

Right now, Intel seems more interested in forcing the second-source producers of the 286 and 8088 into oblivion.

Businessland Sees PC Rentals Growing

PC rentals have been a limited phenomenon. Unlike earlier computer equipment, PCs are so cheap that rented machines have been necessary only in special

circumstances like setting up a temporary location or when dealing with an unpredicted project.

Businessland thinks rentals are poised to take off. Citing the tendency of many companies to rent top-of-the-line PCs as a way of testing new technology or to fill in for machines in the shop, the chain is planning to open Businessland Rents centers in 20 cities over the next few years.

With so many choices in adapters, disk drives, and printers, there's now more of a motivation to try expensive setups before buying.

Signposts

Many of the stories on hardware and software vendors in the financial papers of late have been reports of layoffs and plant closings. It might lead you to believe that there'll be fewer products coming to market. Unlikely.

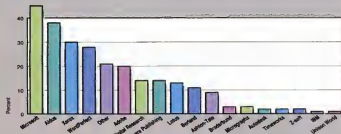
Western Digital has eliminated 400 jobs, reducing its workforce by 12 percent in recent months; but those savings are a result of automating assembly, and the company's revenue continues to rise. AST laid off about 6 percent of its entire staff, but it's scaling back an effort to sell DEC hardware and will concentrate on its core PC products instead.

Leading Edge, on the other hand, is suffering badly. It had to lay off its entire sales force and entertain takeover bids. It's rumored that a supply of bad parts was the last trauma in a series of bad management decisions. The brand will probably be kept on the market with new management.

At the same time, others have been expanding. Macola is doubling its staff and office space; WordPerfect Corp. has just finished doubling its personnel (including a doubling of the telephone support crew to 400); and Dell Computer is tripling its capacity in 1989.

—Gus Venditto

From which of the following companies will you or your company purchase desktop publishing and/or graphics software within the next 12 months?



Get out of the danger zone with Oracle's dBASE compiler



Announcing ORACLE Quicksilver

All the database Top Guns are flying SQL, the industry-standard data management language first delivered by Oracle. Now, ORACLE Quicksilver adds SQL and connectivity to your dBASE applications, so you can fly them into the 1990s.

Your ticket to the future

ORACLE Quicksilver is a compiler that turns your dBASE programs into fast, secure, multi-user applications that can access both distributed ORACLE and dBASE data. It delivers all the capabilities of dBASE, plus powerful extensions like windowing, graphics and user-defined functions. You can even add SQL statements to your dBASE programs for more powerful, flexible data access.

ORACLE database included

ORACLE Quicksilver comes with the ORACLE RDBMS. So you can get automatic indexing, comprehensive security, and mainframe-class data integrity.

Why wait until dBASE IV can talk to SQL Server?

dBASE IV doesn't talk to SQL Server yet. When it finally does, it will only talk to SQL Server on OS/2—not on any other operating system. Which means you'll still be isolated from corporate data on minis and mainframes.

Add connectivity to your dBASE applications today

Your ORACLE Quicksilver applications can talk to ORACLE SQL databases on your PC today. And with our optional networking software, you can build distributed databases across ORACLE servers on PCs, minis and mainframes—including IBM DB2 data.

No-risk Money Back Guarantee

Test fly ORACLE Quicksilver now. If you're not out of the danger zone in 30 days, return it for a full refund. **Limited Time Free Offer:** Order now and, for a limited time, you'll receive ORACLE SQL*Tutor—our on-line SQL training program—absolutely free.

Call 1-800-ORACLE1, ext. 4425 today.
Or fill out and return the attached no-risk coupon now.

Dear Oracle...

Oracle PC Direct • 20 Davis Drive • Belmont, California 94002
1-800-ORACLE1, ext. 4425

Send me the following ORACLE products for my PC.* Enclosed is my ☐ check or ☐ VISA ☐ MasterCard ☐ AMEX credit card number and authorization for:

- \$ _____ ORACLE Quicksilver at \$699 and
ORACLE SQL*Tutor free
\$ _____ ORACLE SQL*Tutor ONLY for \$199
\$ _____ Please add appropriate state sales tax
\$ _____ Total enclosed/authorized.
I understand Oracle will pay for shipping, and all prices valid in U.S. only.

NAME _____ TITLE _____
COMPANY _____
DIRECT line PC sales person _____
CITY _____ STATE _____ ZIP _____
PHONE _____
CREDIT CARD NO. _____ CARD EXPIRATION DATE _____
SIGNATURE _____ YOURS DATE _____ PC MAGAZINE _____

*REQUIREMENTS: ORACLE SQL*Tutor (386 PC and hard disk) ORACLE Quicksilver (to manage only dBASE, dBase files and no ORACLE databases) you need a 486 PC. To manage an ORACLE database on a remote computer you need a 486 PC and optional networking software. To build an ORACLE database on your PC, you need a 386 or 386 PC with 640K plus 1MB of expanded memory. All configurations require hard disk and DOS 3.0+.

ORACLE®

COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-ORACLE1, ext. 4425 today.

Copyright © 1989 by Oracle Corporation. ORACLE is a registered trademark of Oracle Corporation. Also trademarks: dBASE of Ashton-Tate, Quicksilver of Quicksilver Software, Inc. DB2, OS/2 and IBM of International Business Machines. Other companies mentioned are numerous trademarks. TRISA

20 Davis Drive, Belmont, CA 94002 • World Headquarters
(415) 588-8000 • ORACLE Canada (800) 387-4437 (Vancouver/Quebec)
Quebec (514) 337-0750 • ORACLE Systems Australia
(61) 2-959-5080 • ORACLE Europe 44 (1) 548-0111 • ORACLE Systems
Hong Kong (852) 5-2688-66

Finally...The First Bus-Mastering Hard Disk Controller for the Micro Channel

PC HANDS ON

BY WINN L. ROSCH

Sometimes revolutions tiptoe in so quietly you might not notice the radical changes they bring until they've slipped into your life. Core International's new MCA hard disk subsystem, a combination of the company's \$6,495 HC-380 hard disk and \$595 CNT-MCA disk controller, is a case in point. You may be tempted to buy this pairing for your PS/2 Model 60 or 80 just because it's among the fastest mass-storage combinations around. In fact, as the first bus-master disk subsystem for the Micro Channel architecture, the pain ushers in a entirely new technology.

Put simply, a bus master can take over control of the expansion bus and directly access memory or other devices connected to it. While the bus master is in control, the host computer's microprocessor can do other things.

Although current software doesn't take much advantage of this ability, bus masters earn merit for another benefit. Even the best conventional bus tech-

nologies require at least two microprocessor cycles to move a byte from point A in memory to point B—one cycle to set up the transfer and one to make the actual data move. The bus master can make the memory move in half the time (one bus cycle). Potentially, the effective data throughput between disk and computer can double.

The Core system exploits both benefits of bus mastering technology. Novell-based systems can take advantage of the subsystem's ability to duplex hard disks, which uses some of the CNT-MCA's bus master power. Two Core disk drives connected to the controller can operate in tandem, capturing all disk writes at the same time and assuring that you will have a duplicate for backup should one disk fail. (Although the CNT-MCA controller will work with other drives, it supports duplexing only with Core drives.) At the same time, bus master speed gives the total system a performance edge over other hard disk options.

The HC-380 hard disk is based on a high-performance Control Data Corp. drive that features a DOS formatted ca-

capacity of 380MB (442MB unformatted). It delivers an average access time of 16 milliseconds and transfers data at 10 MHz, thanks to its ESDI interface.

The CNT-MCA controller is a 16-bit Micro Channel expansion card that follows the IBM standard to the letter. The current implementation supports one or two ESDI drives with data transfer rates of 10 MHz. An upgraded version to handle future 15-MHz ESDI drives is in the works.

Unlike the standard-equipment IBM hard disk controller, the CNT-MCA will coexist with other controllers, including both the IBM and a duplicate of itself. You can keep your stock IBM drive and add the HC-380/CNT-MCA system without a hassle.

In testing, performance proved the technology. As data blocks get larger, the Core system edges past twice the speed of the stock IBM system—more than could be hoped for from the upgrade to the ESDI interface alone. (System overhead and mechanical factors prevent doubling the throughput.)

In truth, the performance

PC FACT FILE

Core HC-380 (hard disk)
Core CNT-MCA (controller)
Core International
7171 N. Federal Hwy.
Boca Raton, FL 33487
(407) 997-6055
List Price: Core HC-380,
\$6,495; Core CNT-MCA,
\$595.

Requires: IBM PS/2 with Micro Channel architecture.

In Short: A high-performance hard disk subsystem for Micro Channel PS/2s, featuring the first bus-mastering hard disk controller for the MCA. Supports Novell disk duplexing.

CIRCLE 484 ON READER SERVICE CARD

improvement alone may not be enough justification for this system. However, its support of Novell duplexing as well as multiple drives and controllers makes it an excellent choice for Micro Channel-based servers. Although the HC-380/CNT-MCA combination only hints at the potential of Micro Channel bus masters, its power and performance confirm that the revolution is under way.



Benchmark Tests: Core CNT-MCA Disk Subsystem vs. Stock IBM PS/2 Model 60 Subsystem

The Core CNT-MCA provides substantial improvement over the IBM PS/2 Model 60's standard controller, though the favorable test results are mainly a result of the faster mechanical speed of the Core disk. The disk tests were not designed to reflect the performance gains of a bus-mastering controller.

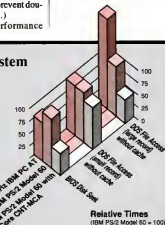
Performance Times

(Times given in seconds except where noted)

	BIOS Disk Seek (milliseconds)	DOS File Access (small record) without cache	DOS File Access (large record) without cache
8-MHz IBM PC AT	29.20	72.63	19.74
IBM PS/2 Model 60	37.24	72.41	10.86
IBM PS/2 Model 60 with Core CNT-MCA	16.55	60.99	5.11

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

The **DOS File Access** benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file-management functions: Five tasks—file creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.



The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

Watch for our weekly ads in the centerfold of Sunday's New York Times second main section.

Panasonic



SPECIAL

KX-P1092!
Dot Matrix Printer
240 CPS draft, 48 CPS HQ, 10, 12, 15, 17 and proportional. Friction and adjustable tractor. Graphics. Centronics parallel.

\$299⁹⁵

Panasonic



NEW!

KX-P1180
Dot Matrix Printer
192 CPS draft, 36 CPS HQ mode & selectable fonts. Push-out tractor feed. Proportional spacing. Centronics parallel.

\$189⁹⁵

EAHP191 10025100100 100 100 100 100

hp HEWLETT PACKARD



Super Special!

HP-2276A
Desk Jet Printer
18.5 jet printer. Laser quality output. Quiet operation. 340 CPS draft mode. 120 CPS 10 mode. Built-in sheet feeder. Parallel & RS-232C serial.

\$699⁹⁵

Panasonic



SPECIAL

Laser Printer
Prints up to 11 ppm 12K RAM. 300 sheet paper input. 11x17-in. format. Parallel/serial.

\$1399

hp HEWLETT PACKARD



Laserjet II
8 pages per minute. 200 sheet capacity. 512K RAM. 50 sheets. Two toner cartridge slots. Parallel and serial interface.

In Stock

TOSHIBA



P-341-SL
24-Pin Dot Matrix Printer. 216 CPS draft, 72 CPS HQ. Toshiba and IBM emulation. Front panel font and pitch selection. Built-in tractor and friction. LCD status indicator. Parallel, RS-232C serial.

\$569⁹⁵

PRINCETON



MAX-15 Autosync Mono Monitor

14" flat screen monochrome monitor for IBM PC, XT, AT & PS/2 & compatible systems. Supports CGA, EGA, VGA, MGA & Hercules modes. Built-in tilt and swivel base. Non-glare etched screen & easy-to-reach controls.

\$269⁹⁵

LOGITECH



Now Available for PS/2

\$259⁹⁵

Scan Man
Hand held scanner with a 4 inch scanning window. Scan and store images from various sources to be used with popular paint and Images Publishing software.

\$189⁹⁵

LASER CONNECTION



Postscript for HP

SPECIAL!

Jetscript
Turn your HP Laserjet II into a powerful PostScript printer for desktop publishing. Includes 386 data & 35 resident typefaces. Accepts Adobe typefaces.

Call

Plus



Hardcard
A high performance hard drive on a card fits XT or AT. Takes up only one slot and is easy to install.

20MB Hardcard \$499
40MB Hardcard \$649

CALERA



Simply the best PC-based OCR system I've seen

TrueScan
TrueScan gives your HP or DeskScan the intelligence to capture everything on a page. Whether typewritten, typeset, laser printed, computer generated or even documents scanned, regardless how complicated the page is.

TrueScan 5 or 7MB RAM \$2195

AST RESEARCH INC.



Advantage/2
Advantage/2 with 512KB RAM upgradeable to 1MB. Features easy installation. Takes full advantage of the PS/2 model 50 & 60 high performance data bus & extended memory addressing capabilities. All in one extension slot.

\$319⁹⁵

DEST



PC Scan 2020
Image and text scanner. The total desktop publishing solution. Up to 300 DPI res. 256 level grey scale image scanning. Built-in SCSI port.

Call

intel



Special Introductory Price!

Connection CoProcessor
A 9600 FAX modem communications board for XT, AT and compatibles, allows you to send and receive virtually any type of file over ordinary phone lines. You need no special software. Designed for transmission time. Popping to other users need of all transmissions. Optional 2800 Hayes digiback modem fax or Intel Connection CoProcessor. Optional 2800 Hayes digiback modem available.

\$769⁹⁵

FOR CONNECTIVITY OUR NETWORKING

MAXUM 286 30 DAY MONEY-BACK GUARANTEE!

Buy with confidence. The acclaimed 286 computer offers high quality with exceptional performance and value. You also get one-year on-site "GE" service and access to our direct Technical Support Hotline. Were so sure you'll be satisfied that we back your 286 purchase with a 30 day money-back guarantee providing it's in the original configuration and packaging as delivered and has not been altered, modified or damaged by buyer.

MAXUM 286 TURBO

WITH 12-MONTH ON-SITE LIMITED WARRANTY*

Hard Drive Mono-Graphics Systems

- 80286 processor • 512K RAM
- 8 expansion slots • 12MB disk drive
- Battery backed clock/calendar
- 5 storage device cables
- Hard/floppy disk controller
- 101 enhanced keyboard • Monographic card
- 10" monochrome monitor



40MB Hard Drive in misc	\$10M95	\$812M99
40MB Hard Drive no misc	\$1549	\$1749
64MB Hard Drive in misc	\$1649	\$1849

EGA 640x350 Card & EGA Monitor (dismount of Monval add \$449)

* Onsite service within 100 miles of GE service locations applies to parts and labor on CPU, monitor, video and standard I/O in advertised package. Hardware and disk drive, if found to be defective in material and workmanship for more details please call.

NEC PowerMate™ 386/20

- 80286 CPU
- 20MB • 2MB RAM
- 5 1/4" 1.2MB drive
- 16MB 62ns hard drive
- 2 serial, 1 parallel
- 101 enhanced keyboard
- MS DOS 3.3 • On Site



Super Special

Vendex HEAD START™ III

- 80286 8/12 MHz switchable
- 1MB RAM included, upgradeable to 3MB
- 5 1/4" 1.2MB disk drive
- 3 1/2" 1.44MB disk drive
- 32MB 62ns hard drive
- VGA analog graphics adaptor with EGA, CGA, MGA & Hercules software compatibility
- 245-232C serial ports
- Parallel printer port
- Joystick port
- 3-button mouse
- Enhanced 101 keyboard
- MS DOS 3.3/CW BASIC
- Bundled software
- VGA color or VGA monochrome monitor (optional)



Special Introductory Offer!

67 West 47th St.
CA LIC. #00709, #07880
1-212-398-1410

116 Nassau St.
CA LIC. # 01127
1-212-608-6934

715 West 45th St.
CA LIC. #00709, #07820
1-212-398-1410

E. Meadow Plaza Shopping Ctr.
East Meadow Long Island
1-516-794-3660

SOLUTIONS, CONSULT GROUP (212) 254-3105

MAXUM*

Turbo-XE II

20MB Hard Drive System

- 8088 4.77/5.54 MHz • 640K RAM
- Parallel/Serial port • Clock/calendar • Built-in CGA color & monochrome video card • 5 1/4" 360K floppy • 20MB hard drive • MS DOS 3.1
- GW Basic • Keyboard • 10/220V switchable

\$895

Monitor Optional
with 40MB **\$995**



NEC

Multispeed* HD with 20MB Hard Drive

- 640K RAM
- 3 1/2" 720K floppy
- 20MB hard drive
- Rechargeable battery
- Backlit display
- Parallel and serial
- MS DOS 3.2

\$1995



LEADING EDGE*

Model D-30

- 8088 CPU
- 520KB hard disk drive
- 4.77/7.68MHz
- 512K RAM
- Parallel, serial port
- MS DOS • GW Basic

\$995

Model D-3 386 \$3195

FREE
monochrome
monitor
included



NEC

PowerMate* 1 Plus

80286 Desktop

- 80286 CPU • 640K RAM
- 1.2MB 5 1/4" floppy drive
- 40MB CD-ROM drive
- Enhanced 101 keyboard
- DOS 3.1 & GW BASIC
- 3 internal storage devices
- Parallel/serial ports

\$2195

LEAVE IT
\$88.00
New York City



AST

Premium 386-C/340

- 80386 33MHz CPU
- 1MB RAM • 64 high speed cache memory
- 5 1/4" 1.2MB floppy drive
- MS DOS 3.1 & GW Basic • Dual manager
- 2 serial, 1 parallel port • Enhanced keyboard

\$3495

386 Model 300 (AST-60 Limited quantity) **\$2495.00**



COMPAQ

Deskpro-386-S

Model 20

- 80386 SX CPU—5MHz
- 1MB enhanced page memory
- 5 1/4" 1.2MB drive • 20MB hard drive
- Video VGA graphics card
- Parallel & serial port • Enhanced keyboard

\$1995

Compaq
computers are
worry
free
guaranteed
by AT&T
Computer



NYC stores open Sun 10-5, Mon-Thurs 9-6, Fri 9-3. Long Island store open
Sunday 10-5, Monday-Wednesday 9-4, Thursday 9-5, Friday 10-5.
We also carry for credit cards. Personal checks are accepted with delay. Approved Min. income
& funding 10-10. No corporate checks on card. The 1st supervisor at previous PC Magazine
ads. We are not responsible for non-payment errors. Quantities may be limited on some items.

Lease it with LeaseCard*

Lease Card for equipment between \$500 & \$5000 are based on 36 monthly payments, lower
rates and 48-60 monthly payments are available for equipment purchase totaling \$4000 and
up. Only this equipment needed for tax and freight excluded. Rates apply to commercial and profes-
sional leases only. Price valid through April 30, 1988.

©1989 47th Photo

PCM 04-11-89

47st. Computer*

To order in N.Y. State call **1-212-608-6934**

Out-of-State **1-800-221-7774**
Toll-Free

Mail Order Address:
35 East 19th Street, N.Y.C. 10003



Corporate Accounts Welcome
Volume purchase pricing available, please call.

For store locations, please see information box below.

Ami.



The word processor that lets
you see what's on your mind.
Design & see how documents will
look as you write, includes dozens
of professionally designed sheet
layouts. Operates under windows
environment. WYSIWYG screen
display **\$995**

CHRONOS



Given you a 5-way view of people,
projects and time. Decides the peo-
ple you work with, your projects
and tasks, displays daily calendars,
includes prioritized to-do lists. Re-
quirements: MS-DOS, IBM & com-
patibles, hard disk, 512K RAM.
\$1195

XYQUEST



XyWrite III Plus
New XyWrite III Plus makes the
powerful word processor the
easiest to learn. Single keystroke
produces menus of logical options.
Runs on all IBM & true compatibles.
\$2195

Lotus. 1-2-3.

FREE
Funk Software
Always
purchase of
1-2-3 (\$150 value)

Given you the most widely used business software, spreadsheet, graphics
and database in one fully integrated package. **\$2995**



First Publisher



Turn ordinary word processed
documents into attention-getting
publications with First Publisher.
You can create newsletters, flyers,
reports, announcements & more.
\$7495

meca



Managing Your Money
The financial software that does it
all. Manage your checkbooks and
budgets, stocks and bonds, real
estate, taxes, loans and mortgages
and more. **\$1185**

Microsoft

Excel

version 2.01

The best integrated business program—

Inquire about Microsoft's exciting promotion!
\$19995

Requires 286
or 386 computer

CHIPSOFT, Inc.

TurboTax

FOR 1988 TAXES



FOR 1988 TAXES

J.K. Lasser

Your Income Tax

Easy to use menu simplifies each
step of tax preparation. Supports
printing of IRS 1040 form. Tax Alert
feature for telephone support.
\$4495

Diskettes

A name that has been trusted for
quality products. And like all Kodak
products Kodak diskettes provide
quality & reliability for data storage.
5 1/4" 25-50 03020 **7.99**
5 1/4" 25-50 11248 **12.99**
5 1/4" 25-50 12500 **13.99**
5 1/4" 25-50 110388 **35.95**
Volume pricing available



FREE
SURGE PROTECTOR
purchase of 5 1/4" 25-50
write diskettes
one per customer

Omniview: Aspiring Multitasker Falls Short

PC HANDS ON

BY BARRY SIMON

I've been hooked on the context switching you get with *Software Carousel* for some time: it allows you to keep as many as ten applications open at once and jump between them with just a touch of a key. But of late I've yearned to go beyond *Carousel*'s switching to true multitasking.

I've tried several multitasking environments, but I found them too intrusive and/or too incompatible with the programs I like to run. So I was excited by Sunny Hill Software's *Omniview*, a new multitasker whose basic philosophy is closer to my taste. Alas, it still has too many serious problems to become a permanent fixture on my system yet.

The basic idea of *Omniview* is to multitask only on a full-screen basis. While I'm a fan of *Microsoft Windows*, I've no interest in running applications in

—OMNIVIEW SHELL Version 4.11, (C) Copyright 1986, Sunny Hill Software—
 Set using Arrows, Home, End, Del, Ins, Ctrl-Arrows, etc.
 Use Tab, or F5 to move from Field to Field, F1 for help, Esc to cancel.

Change a program
 Standard Options

Program title: _____
 Starting command: _____
 Starting directory: _____

Required memory: ☐ Desired memory: ☐ Maximum expanded memory: ☐

Can swap to disk: Write directly to screen: ☐
 Run in background: Display type: ☐

Advanced Options

High speed communications: ☐ Support for Toplevel functions: ☐
 Use printer: Issue in 905 after end: ☐

Lower background priority: ☐
 Base priority:
 Clocks time in per slice: ☐

Each *Omniview* partition has its own start-up card, which you fill out to determine memory size and various advanced options.

a window when they think that they have the whole screen, so I regard the full-screen operation of *Omniview* as a virtue.

Omniview is quite easy to set up. Like *Carousel*, you set up individual partitions that you can toggle between once you're up and running. For each partition, you can specify whether it should run in the background

and whether it can swap to disk, as well as a few other parameters. The set of options is less extensive than that of *DESQview* but more complicated than that of a pure context switcher like *Carousel*.

In the menu mode, there is a simple form to fill out for each application. The manual comes with forms filled out for 40 pop-

ular applications.

A number of software tools are provided to enable you to write powerful batch files. For example, you could spawn a new partition to copy a file in the background while the foreground batch file continues.

To multitask in more than 640K, you'll need an EEMS board or LIM 4.0 memory explicitly able to swap memory below the 640K boundary. With an 80386-based computer, *386-to-the-Max* or *QEMM-386* will give you this LIM 4.0 capability. *386-to-the-Max* provides specific support for *Omniview* that will also give you virtual screens to prevent one application from bleeding through to another.

All in all, the product seems well planned. Unfortunately, it doesn't work very well. During the past few months, I've seen several released and intermediate versions of this product, and each one has had serious problems. I have not yet been able to run *SideKick Plus* under *Omniview* on my system—an IBM PC AT with an Intel Inboard and Genoa EGA. On most versions, including the latest, I've been unable to successfully run a communications program in the background. On the current edition (Version 4.11), running DOS's mono mode on a two-monitor system crashed the computer.

This product bears watching. But at least for now, if you require multitasking, look elsewhere. [E]

Pizazz Plus Captures Images to DTP Formats, Converts Color to Gray Scale

PC HANDS ON

BY JONATHAN MATZKIN

When *PC Magazine* first reviewed *Pizazz*, we described it as a "turbo-charger" for your PrtSc key, because it added a whole range of image-manipulation possibilities to DOS's lowly screen-dump facility. The memory-resident utility pops up over most any text or graphics screen and allows you to capture and manipulate the image. *Pizazz Plus*, as it is appropriately called, looks much like its predecessor but adds a laundry list of new features.

To begin with, *Pizazz Plus* supports a much wider range of graphics standards, including VGA. There is also support for some of the high-end image-capture systems, like AT&T's

Targa board. Improved dithering and screen analysis allow *Pizazz Plus* to specify a total of 16 million possible colors on color output devices or up to 256 shades of gray on monochrome printers. The package now supports a total of 220 printers. Of course, results vary according to the capabilities of a particular output device.

The package also effectively translates color images into gray scales. Results aren't of photographic quality, but *Pizazz Plus* puts out good-looking halftones on an HP LaserJet Series II.

Another major enhancement allows you to save a captured screen image in a variety of formats. *Pizazz Plus* stores images that will print in supported applications, such as *Ventura Publisher*, *Microsoft Word*, and *WordPerfect*, exactly as they

are printed by *Pizazz Plus*. So a user can fuss with an image until it is ready, store it, and then print it out in the appropriate application. There are also two formats, for *Publisher's Paintbrush* and *Spinnaker Software's Splash*, that store screen-based images rather than printer image files.

Pizazz Plus builds rather nicely on the success of its useful predecessor. It helps simplify the inclusion of graphics images in desktop publishing projects. [E]

List Price: *Pizazz Plus*, \$149;

upgrade from *Pizazz*, \$59.

Requires: 32K free RAM, graphics adapter, DOS 2.0 or later. Not copy protected. Application Techniques Inc., 10 Lomar Park Dr., Pepperell, MA 01463; (508) 433-5201.

CIRCLE 456 ON READER SERVICE CARD

PC FACT FILE

Omniview, Version 4.11

Sunny Hill Software

P.O. Box 55278

Seattle, WA 98155-5278

(206) 367-0650

List Price: \$89.95

Requires: 256K RAM, DOS

2.0 or later. Not copy protected.

CIRCLE 441 ON READER SERVICE CARD

More power to the people.

ORACLE
5.1B
IS HERE

ORACLE has led a revolution in PC relational database technology. More power. More portability. More connectivity. More reasons than ever to make ORACLE your corporate standard database.



New tools with even more power.

We're proud to announce our newest release—Professional ORACLE Version 5.1B. Now you can run your applications in OS/2 or in protected mode above 640K in MS-DOS. So you have more room for more powerful applications. And those same applications run unmodified on almost all workstations, minicomputers and mainframes.

Version 5.1B delivers a new level of power to your PC developers including the latest versions of:

- **SQL*Forms®** NEW! Enhanced 4th-generation application development environment.
- **SQL*Menu®** NEW! Flexible interface builder for defining complex menu systems.

• **SQL*ReportWriter™** NEW! Non-procedural development and runtime powerhouse for producing any report.

• **SQL*Plus®** Oracle's ANSI-standard SQL query and administration tool.

• **Pro*C™** The C-language pre-compiler and subroutine call interface to ORACLE.

Learn SQL on us.

Learn the language of the revolution. Order Professional ORACLE today for \$1299 and we'll include ORACLE SQL*Tutor, a nine-module PC-based SQL instruction program that sells by itself for \$199.

Try ORACLE for \$199.

Our Trial Version is identical to Professional ORACLE, but can't be used in networked configurations and allows a maximum user database size of 1 MB. It's a powerful tool for prototyping your first ORACLE application. And its price can be applied to the purchase of a full Professional ORACLE license.

ORACLE®
COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-ORACLE1, ext. 4431 today.

Money-back guarantee.

If you haven't tried ORACLE yet, now there's even more reason to join the SQL revolution. More tools. More power. If ORACLE 5.1B doesn't revolutionize the way you develop PC database applications, return it within 30 days for a full refund.

Call 1-800-ORACLE1 ext. 4431, or an ORACLE MasterVAR today.

Dear Oracle

Oracle Direct • 20 Davis Dr. • Belmont, CA 94002
1-800-ORACLE1, ext. 4431

Since your 30-day money-back guarantee eliminates any risk on my part, please send me the software below. Enclosed is my ☐ check, or ☐ VISA ☐ MasterCard ☐ AmEx credit card authorization. Offer valid only in the USA. Please send ☐ 5.25" High Density or ☐ 3.5" disks.

☐ Professional ORACLE for MS-DOS with free ORACLE SQL*Tutor for \$1299 \$

☐ Professional ORACLE for MS-DOS Trial Version for \$199 \$

☐ Professional ORACLE for OS/2 for \$1299 \$

Professional ORACLE Requirements: 80486—380486/80386 PC with MS-DOS 3.0 to 4.0, hard disk, 5MB or memory and 8MB extended memory required. 2.5MB of extended memory required for SQL*ReportWriter. OS/2—386/486 IBM PC with OS/2 V1.0, hard disk, 3MB memory. SQL*ReportWriter not available for OS/2 and is replaced by SQL*Report.

☐ I just want ORACLE SQL*Tutor for \$199 \$

MasterCard Requirements: 7500 PC with hard disk. Credit monitor suggested.

Subtotal \$

Please add appropriate sales tax \$

Total enclosed/authorized (USA only) \$

NAME _____ TITLE _____

COMPANY _____

STREET (no P.O. boxes, please) _____

CITY _____ STATE _____ ZIP _____

PHONE _____

CREDIT CARD NO. _____ CARD EXPIRATION DATE _____

SIGNATURE _____ TODAY'S DATE _____ PC MAGAZINE

\$79 PC Tools Deluxe Adds Format Recovery, Disk Defragmenter, Desktop Accessories

PC HANDS ON

BY EDWARD MENDELSON

Older versions of *PC Tools Deluxe* resembled a Swiss Army knife. The redesigned edition—Version 5—resembles a combination hardware store, stationery supplier, and gadget catalog.

The foundation of Central Point Software's \$79 package is a traditional ensemble of disk and file utilities, now incorporated into a mouse- or keyboard-driven DOS shell that can run applications as quickly as it recovers deleted files. CPS adds a backup program, a disk defragmenter,

a format recovery program, and a custom version of the *Super PC-Kwik* disk cache that earned Editor's Choice in the recent *PC Magazine* cache roundup (February 14, 1989).

To all this, the new version adds an elaborate Desktop program, modeled loosely on the *Microsoft Windows* and *Macintosh* desktops.

The Desktop includes a miniature word processor with spelling checker, which can open 15 files at once; three calculators, including an elaborate financial one; a flexible scheduler; a simple database; an even simpler outline; and a rudimentary telecommunications program that can transfer files in the background via Xmodem.

You can run *ProKey*-compatible keyboard macros that will work in the Desktop alone and also in your applications, and you can use a clipboard to transfer data from any applica-

tion to another. Add to all this a file encryption program, and you'll understand why the manual fills 500 pages, not counting a 24-page addendum and a last-minute README file.

Both Desktop and shell can be run as resident or nonresident programs. As a TSR, the shell swallows as little as 9K of DOS memory while stowing the rest

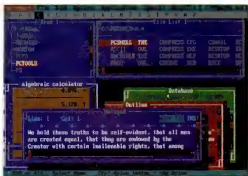
But Norton has nothing to compare to the *PC Tools Deluxe* Desktop, which falls between Borland's *SideKick* and Lotus's *Metro* in power and flexibility and is generally easier to use than both.

PC Tools' shiny new interface uses pull-down menus, dialog boxes, and resizable, movable windows, plus modern conveniences such as an automatically saved configuration that opens each window at the location where you left it yesterday. If you use a mouse, the new interface is more efficient and elegant than the utilitarian interface familiar from earlier versions. But you may find you need to

press a few more keys if you insist on keeping your fingers on the keyboard.

The disk and file utilities stored under the shell rank among the very best. The safe-format program can sometimes extract data from otherwise-unreadable disks. The undelete includes options that virtually guarantee successful recovery of lost files. The defragmenter now offers a full range of choices for rearranging the contents of your disk.

PC Tools Deluxe performs many functions impressively well, but you can get dedicated programs that perform most of its functions better. Your choice is between paying \$79 for the cornucopia of *PC Tools Deluxe* or hundreds of dollars for separate packages. *PC Tools* is without a doubt a good place to start, but you may not want to stay there.



PC Tools Deluxe, Version 5, adds an impressive collection of desktop utilities, including a word processor with spelling checker and a database.

of its code in EMS. The Desktop needs a mere 38K to manage all its features and let you pop them up over any application. No other program offers so much in so little RAM.

The closest rival to the *PC Tools Deluxe* shell is *The Norton Utilities*, which doesn't include a backup or cache but includes more efficient and intuitive tools for editing and managing a disk. The file editor in the *PC Tools* shell, for example, doesn't let you search for data in the file; *Norton's* makes the search effortless. But if *PC Tools* can't excel *Norton*, it generally equals it. Both packages' safe-format programs can sometimes extract data from otherwise-unreadable disks.

Both undeleters include options that virtually guarantee successful recovery of lost files. Both defragmenters now offer a full range of choices for rearranging the contents of your disk.

press a few more keys if you insist on keeping your fingers on the keyboard.

The disk and file utilities stored under the shell rank among the very best. The safe-format program can sometimes extract data from otherwise-unreadable disks. The undelete includes options that virtually guarantee successful recovery of lost files. The defragmenter now offers a full range of choices for rearranging the contents of your disk.

Backup Problems

The most problematic element of the package is the backup program, which requires too many unintuitive keystrokes for initial configuration and is fussy about the exact moment when you must insert the first disk. Although the *PC Tools* cache is a subset of *Super PC-Kwik*, the backup program doesn't coexist with the *Super PC-Kwik* ver-

PC FACT FILE

PC Tools Deluxe, Version 5
Central Point Software
15220 NW Greenbair Pkwy.,
#200

Beaverton, OR 97006
(503) 690-8090

List Price: \$79

Requires: 512K RAM (hard disk and 320K EMS recommended), DOS 2.0 or later.

In Short: Every imaginable file utility and desktop accessory in one mouse-driven or keyboard-driven package. Not copy protected.

CIRCLE 405 ON READER SERVICE CARD

How to speed up your accounting cycle

► Whether you're shopping for your first computerized accounting system or wrestling with some other "solution", you owe it to yourself to see why Bedford's Integrated Accounting software is acclaimed as the **fastest** and **easiest** way to get your small business from transaction to report.

Quick to setup...

Installation is as easy as copying the single program file onto a working disk and typing BEDFORD.

Easy to learn...

Within minutes you will be breezing through the six fully integrated modules using only cursor and escape keys. Sample data files and a self-paced tutorial allow you to get comfortable with the program before entering your own company's data.

If you require additional help, our exclusive Comfort Guarantee provides free technical support and program updates for your first thirty days.

A snap to use...

With Integrated Accounting you'll need to enter transactions only once.

Payroll, Payables and Receivables data are instantly transferred to General Ledger, Inventory and Jobcost as required. On-screen lists of your chart of



Unlike other software that was never built for speed, Integrated Accounting has been optimized to give your small business the boost it needs.

accounts, suppliers, customers, employees and inventory pop up automatically when needed.



**EDITOR'S
CHOICE**
September 1987

Integrated Accounting topped 15 other programs to win this prestigious award

If you need your bottom line in a hurry or a quick check of a client's payment status, a few keystrokes is all it takes to display any report instantly.

Stop wasting time...

Blast down to your nearest Bedford dealer or Radio Shack Computer Center today and, for only \$249 complete, let Integrated Accounting show you the easiest way to speed up your accounting cycle.

Call 1-800-255-8361 to order.

Timeslips interface now available.

bedford.
making software comfortable™
CIRCLE #62 ON READER SERVICE CARD

Bedford Software Corporation • 15311 N.E. 90th Street • Redmond, WA 98052 • Fax (206) 885-0859 • (206) 883-0074

MS-DOS is the registered trademark of Microsoft Corporation • Making Software Comfortable and Integrated Accounting are trademarks of Bedford Software Corp. • © Copyright 1988, Bedford Software Corp. - All rights reserved.

THE BUS STOPS HERE!

CompuStar: PS/2 and PC/AT Compatibility.

Ask any computer expert about what type of system you should buy nowadays and you'll likely get a "pass the bus" response. Something like — "Well, uh, the PC/AT* bus is your best buy but, then again, the new PS/2* bus may become the next industry standard." Great advice, right? If trying to decide on a microprocessor weren't tough enough, now you're expected to pick a bus, too.

RELAX, NOW THERE'S COMPUSTAR®

The all new CompuStar from Wells American not only lets you interchange microprocessors, you can also mix and match buses — a PC/AT bus, a PS/2 bus or... both. As your computing needs change, simply snap in a new processor or add an extra bus. You'll never again have to worry about buying the wrong computer system!

FOUR COMPLETE SYSTEMS IN ONE.

The CompuStar can be configured with any of four microprocessors — an 8086, an 80286, an 80386SX, or an 80386. The processor and up to 16 megabytes of user memory have all been combined, using the latest VLSI technology, on a single, plug-in CPU module. Plus, any time during the first year of ownership, CompuStar users can "trade-in" the CPU module they initially selected toward the purchase of any of the other more powerful modules. Nobody but Wells American gives you this kind of value.

A CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use both buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add an AT bus, just snap in an AT Bus Module. Depending on configuration, the CompuStar can have up to 13 bus expansion slots — all AT slots, all PS/2 slots or a "split-bus" of AT and PS/2 slots. No matter which bus becomes the

next industry "standard," you'll have peace of mind knowing your investment in a CompuStar will be protected.



The CompuStar is also easily expanded. That's because there are seven CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that will leave more room on your desktop than any of the so-called "desktop" models.

A NEW IDEA FROM AN OLD COMPANY.

The CompuStar® Multi-Processor, Convertible Bus™ Microcomputer. It's no surprise that our engineers invented it. After all, we've been making microcomputers longer than anyone else... even longer than IBM! And if that kind of experience doesn't impress you, CompuStar's service programs surely will. You can select an optional overnight module swap-out plan or on-site service from General Electric Corporation — one of the most respected names in consumer electronics. And, of course, every CompuStar carries a full one-year factory warranty.

FINALLY, AFFORDABLE TECHNOLOGY.

Think all this technology sounds expensive? It's not. CompuStar 20MHz 80286 systems start as low as \$1995*. There are also inexpensive 8086 and powerhouse 25MHz 80386 systems available. Plus, there is a wide variety of CompuStar display, tape and disk options including a one gigabyte erasable optical disk. You can choose a factory pre-configured CompuStar or custom design one yourself. Just unlock the front panel and literally "snap-in" a bus, CPU, memory or disk module in a matter of seconds. It's system flexibility never before available... at any price.

While one of our competitors (we won't mention any names) threatens you with "missing the bus," most simply pass the bus. Our new CompuStar, however, eliminates the bus problem altogether. Not to mention the processor problem. Even the expansion problem. Prove it to yourself. Call today about our 31-day trial offer. Oh, and by the way, the next time anyone asks, tell 'em you know where the bus stops.



Wells American.

Corporate Headquarters: 3243 Sunset Boulevard
West Columbia, South Carolina 29169 • 803/796-7800
TWX510-601-2645 • FAX 803/796-7029

*Personal Computer AT, AT and PS/2 are trademarks of International Business Machines Corporation. *Photographs depict optional equipment. A complete price list is available upon request. CompuStar 80286 system (\$1995) includes an AT Bus Module, built-in VGA/EGA display adapter, one 5.25-inch drive with controller, two sensitive parallel-port mouse port, keyboard and 220 watt power supply.

CIRCLE 513 ON READER SERVICE CARD

NEW ON THE MARKET

by Lori Grunin

The 8-page-per-minute NEC Silentwriter LC 890XL features two 250-page sheet feeders.



NEC Silentwriter LC 890XL PostScript Printer

The latest PostScript printer to pop off NEC's production line, the \$6,995 NEC Silentwriter LC 890XL, features Adobe's 68020-based Atlas controller, 4MB RAM (expandable to 8MB RAM for an additional \$2,395), and an optional 20MB hard disk drive.

Primarily designed for use in multiuser and graphics-intensive environments, the printer's optional \$999 drive and new controller offer up to three times faster throughput over the company's previous model, as well as the ability to store large num-

bers of fonts and overlays, according to NEC.

The 8-page-per-minute printer comes with 35 resident typefaces and emulates both the HP LaserJet Series II and the Diablo 630 ECS.

List Price: NEC Silentwriter LC 890XL, \$6,995; 20MB disk drive, \$999; additional RAM, \$2,395. NEC Information Systems Inc., 1414 Massachusetts Ave., Boxborough, MA 01719; (508) 264-8000, (800) 632-4636.

CIRCLE 448 ON READER SERVICE CARD

Step IVward Converts Database Application Code to dBASE IV

To ease the transition from *Clipper*, *FoxBASE*, and *Quicksilver* to *dBASE IV*, Ashton-Tate is offering *Step IVward*, a program to translate the source code from applications of those database products into executable *dBASE IV* code.

The menu-driven utility preserves functions such as file-tree processing, in-code commenting, and full printing capabilities.

List Price: *Step IVward*, \$89.95.

Requires: 640K RAM, DOS 3.1 or later. Not copy protected. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502; (213) 329-8000, (800) 437-4329.

CIRCLE 451 ON READER SERVICE CARD

LazaGRAM Outputs 300 By 1,500 Dpi on Your HP LaserJet

The LazaGRAM, a \$695 laser beam modulator card from FX Unlimited, breaks the 300-dot-per-inch resolution barrier of laser printers, providing 300 by

1,500 dpi. This enables users to output 100-line-screen, 64-shade gray-scale images, according to FX Unlimited.

The card fits into the I/O slot of any Canon-based laser printer equipped with Tall Tree Systems' JLaSer printer controller. LazaGRAM quintuples the number of dpi by manipulating the electrical charges sent to the printer drum, which alters the amount of toner used to generate each dot.

The LazaGRAM supports Ventura Publisher, Page-Maker, and 3B2.

List Price: LazaGRAM, \$695.

Requires: Tall Tree Systems' JLaSer printer controller, Canon-based laser printer. FX Unlimited, 4151 Middlefield Rd., #110, Palo Alto, CA 94303; (415) 494-0888.

CIRCLE 447 ON READER SERVICE CARD

19-Inch Lundy 1612 Displays 1,600 by 1,200 Pixels

For \$9,950, the Lundy 1612 color raster monitor gives demanding graphics users 1,600-

(continues on next page)

HOT PROSPECT

Hand-held Remote Keyboard Runs Your PC from 35 Feet

If you're tired of blocking your dynamite presentations with your body, perhaps it's time for you to move to the back of the room with **Presentation Electronics'** SilentPartner, a \$495 hand-held, programmable remote keyboard.

The SilentPartner's receiver plugs into either the keyboard port or serial port of your PC, be it a desktop or a laptop. You program the keys of the remote using the menu-driven *SProgram* software, then download the information into the receiver. The remote, whose keys glow in the dark, can operate up to 35 feet from the receiver.

The remote keyboard has 23 keys; 20 of them are macro

keys, and the remaining three let you toggle between three sets of macro definitions. A single macro can hold as many as 78 keystrokes. Typically, each set of definitions, or template, will drive one application, and you can create as many templates as you want and store them for future use.

List Price: SilentPartner, \$495.

Requires: *SProgram* software; 256K RAM, DOS 2.0 or later. Not copy protected. Presentation Electronics Inc., 3096 Wiese Way, Sacramento, CA 95833; (916) 646-3402.

CIRCLE 444 ON READER SERVICE CARD



The SilentPartner's hardware consists of an infrared remote control and a receiver that attaches to your PC.

NEW ON THE MARKET

LUNDY 1612

(continued from page 51)

by 1,200-pixel resolution and an on-board 50-MHz TI34010 graphics coprocessor operating at 6 mips (million instructions per second).

Its standard 1MB of display list VRAM (expandable to 8MB) enables the monitor to display 16 colors out of a palette of 4,096 at maximum resolution, or 256 colors at an 8514/A-compatible resolution of 1,024 by 768.

Drivers for over 100 programs, including AutoCAD, Microsoft Windows, Harvard Graphics, WordPerfect 5.0, Ventura Publisher, and PageMaker, come with the display. **List Price:** Lundy 1612 display, \$9,950. **Requires:** 80286-based system. Lundy Electronics and Systems Inc., One Robert Ln., Glen Head, NY 11545; (516) 671-9000.

CIRCLE 450 ON READER SERVICE CARD

Dolch Puts 25-MHz 386 Power into 20-Pound Portable

It was only a matter of time before the 25-MHz 80386 chip found its way into a portable computer, and the time has finally arrived: the Dolch P.A.C. 386-25 now brings the power of that processor to a 20-pound luggage.

The \$9,495 system, which sports the same 640 by 400 pixel Electroluminescent flat-panel

CrossView Helps Pinpoint Data Patterns

Are you going cross-eyed from poring over reams of printouts, all in the attempt to spot some meaningful relationships within your data? CrossView, a \$2,000 software package from DataEase International, simplifies the process of data analysis by providing quick, on-screen, n-dimensional cross-tabulations and pattern identification.

Let's say you have data on the number of widgets your firm has sold in each state for the past 10 years, who sold how many, and the amount of revenue they generated. CrossView helps you target your best or worst salespeople by region and year, by designating each item as a column, row, page, or hyperpage. Changing the breakdown requires only a few keystrokes.

CrossView accepts data from DataEase, the company's database software, or in fixed-field ASCII format. Upon importing the data, the program

stores only unique values, rather than entire records, thereby compacting the dataset.

List Price: CrossView, single-user version, \$2,000; server pack (up to six users), \$3,000; every three additional users, \$1,000. **Requires:** 640K RAM, DOS 3.0 or later (hard

disk and color monitor—CGA or better—recommended). Not copy protected. DataEase International Inc., 7 Cambridge Dr., Trumbull, CT 06611; (203) 374-8000, (800) 243-5123.

CIRCLE 446 ON READER SERVICE CARD

CrossView Analysis Computations		Indicate below how multiple table cell values are to be computed	
Use Name	Computation	Choices for Computation Method	
PRODUCT	81	0: COUNT	16: MINIMUM
SIZE	42	17: EVERY	25: MAX
SIZE	42	2: MIN	18: MINIMUM
SIZE	42	3: MAX	19: MINIMUM
CUSTOMER STORE	45	4: MIN	20: MINIMUM
STATE	45	5: MAX	21: MINIMUM
DATE	46	6: MIN	22: MINIMUM
MONTH	47	7: MIN	23: MINIMUM
QUARTER	48	8: MIN	24: MINIMUM
YEAR	49	9: MIN	25: MINIMUM
UNIT PRICE	50	10: MIN	26: MINIMUM
SALES	51	11: MIN	27: MINIMUM
		12: MIN	28: MINIMUM
		13: MIN	29: MINIMUM
		14: MIN	30: MINIMUM
		15: MIN	31: MINIMUM

When creating tables with CrossView, you can specify mathematical transformations to perform on a desired item.



The Dolch P.A.C. 386-25's SCSI bus attains data transfer rates of up to 4 megabytes per second, according to Dolch.

display as the other Dolch P.A.C. luggage machines, comes with standard features such as a 19-millisecond 40MB hard disk, 4MB RAM, a 1.2MB floppy disk drive, an SCSI port, and six expansion slots.

List Price: Dolch P.A.C. 386-25, \$9,495. Dolch Computer Systems, 2029 O'Toole Ave., San Jose, CA 95131; (408) 435-1881.

CIRCLE 440 ON READER SERVICE CARD

Send-Off! WordPerfect and 1-2-3 Files from Your Connection CoProcessor

WordPerfect 5.0 and Lotus 1-2-3 users who've installed Intel's Connection CoProcessor in their machines can now harness that board's ability to perform background communications with Intel's Send-Off! software add-ins.

The Send-Off! add-ins enable users of these applications to transmit and receive faxes

and files from within either application. WordPerfect graphics, charts, and formatting and binary-format 1-2-3 worksheets can be transferred in the background, thanks to the board's 10-MHz 80188 processor.

Send-Off! is free to registered Connection CoProcessor users. The 1-2-3 add-in will be sent automatically to all board

owners and bundled with it in the future; WordPerfect 5.0 users, on the other hand, must request a copy of the software from Intel.

List Price: Send-Off! add-ins, free to registered users of Intel's Connection CoProcessor. WordPerfect 5.0 add-in available upon request. Lotus 1-2-3 add-in will be sent automatically and

provided with all new Connection CoProcessor boards. **Requires:** Intel's Connection CoProcessor, Lotus 1-2-3 or WordPerfect 5.0. Not copy protected. Intel Corp., PCEO, CO3-7, 5200 NE Elam Young Pkwy., Hillsboro, OR 97124; (503) 629-7354, (800) 538-3373.

CIRCLE 446 ON READER SERVICE CARD

FAST CRO ORDER LINE: 1-800-441-FAST

WordPerfect 5.0



\$215

List \$495

The most popular word processor is now even better than ever! Version 5.0 adds multiple font support, graphics integration, page preview and much more. WordPerfect 5.0 still retains its feel and ease of use that made it #1. Combine this with the best support in the industry and you can't lose.

SPECIALS

TOSHIBA T1000 \$749



The Toshiba T1000 is the perfect second PC! It comes with 512K of ram, a 720K floppy drive, a supertwist LCD screen and MS-DOS in rom! All this in a battery-powered 7 pound package. A 768K ram card is just \$269 and can be set as base, expanded, or a non-volatile ram disk.

Panasonic KX-P1124

24 Pin Printer

\$309



Panasonic's new 24 pin dot matrix printer gives you more features per dollar! It comes with paper parking and three paper paths for easy handling. The EZ-set operator panel lets you choose from five fonts, six pitches, per cut and more. Its 11.7" carriage is perfect for envelopes or single sheets in landscape mode. All this and a two year warranty.

HARDWARE

PRINTERS

ALPS	LIST	FAST
Alegro 24	499	319
Citizen		
120D	229	145
180D	259	165
MS-P40	449	299
Tribute 124	599	429
Diconix		
150P	499	299
Epson		
Futaba		
DL 3400	995	549
NEC		
P2200	569	339
P5200	799	509
P5600	1049	669
LC890	4799	Call
Okidata		
182 Plus	319	219
320	499	329
330	469	349
330	1499	949
Panasonic		
KXP1180	300	Call
KXP1191	400	Call
KXP1124	529	Call
KXP1595	749	419
KXP1524	949	519
KXP4450	2595	1499
Star		
NX1000	289	169
NX2400	499	309
NB2410	699	429
Toshiba		
P321SL	749	459
P341SL	999	599
P351SL	1499	929

BOARDS

AST	LIST	FAST
Hot Shot 286	645	339
Six Pak Plus 64K	210	119
DTK		
286 10mhz M/B	499	249
XT 1.2mb FDC	79	45
Everex		
1200B Int Modem	149	69
2400B Int Modem	249	129
Genoa		
Super EGA Hi-Res+	399	169
Super VGA #5100	445	239
VGA Hi-Res #5200	645	359
Hercules		
Graphic Card +	299	169
Intel		
8087-2	250	149
80287-10	480	249
Above Board Plus	795	419
Ochard		
ProDesigner	499	299
Tiny Turbo 286	445	269
Twin Turbo 12mb	645	359
Paradise		
Autoswitch 480	349	Call
VGA Plus	399	259
VGA Plus 16	499	299
VGA Professional	799	499
Practical Peripherals		
1200B Int Modem	99	65
2400B Int Modem	199	149
Prometheus		
Promodem 2400B	199	129
Promodem 2400G	249	159

The Complete PC

Answering Machine	LIST	FAST
Fax 4800	399	239
Hand Scanner 400	249	149
USRobotics		
1200 Baud Internal	149	69
1200 Baud External	179	89
2400 Baud Internal	279	119
2400 Baud External	279	149
Video 7		
Fast Write VGA	549	335
Vega Deluxe	379	Call
Vega 4	499	259
V-RAM VGA	799	469

LAPTOPS

Megahertz Modems	LIST	FAST
2400B Toshiba	299	149
2400B NEC, Epson	399	199
Mitsubishi or Zenith	399	199
Mitsubishi		
MP-286L Dual	3195	1879
MP-286L 20mb	4595	2449
NEC		
Multispeed EL II	2295	1449
Multispeed HD	3695	2249
Toshiba		
T1000	1249	749
T1200F	2099	1369
T1200FB Backlit	2399	1499
T1200HB Backlit	3599	2399
T1600	4999	2999
T3200	5799	3959
T5100	7499	4495
Zenith		

MONITORS

Magnavox	LIST	FAST
78M749 VGA	229	149
9C0M82 VGA	649	419
Mitsubishi		
1409 RGB	399	259
1410 EGA	599	399
Diamond Scan 1381	799	479
NEC		
Multisync 2a	799	Call
Multisync Plus	1399	869
Princeton		
Max15	389	Call
Ultralite	849	489
Ultra16	1375	859
Sanyo CM1430	995	599
Sony		
1302 Multiscan	995	659
1303 Multiscan	825	469
Zenith 1480	999	599

DISK DRIVES

Miniscribe	LIST	FAST
40MB AT #3650	499	319
Mitsubishi		
40MB AT MR535 22ms	825	399
Seagate		
20MB XT Kit #225	599	267
30MB XT Kit #238	699	287
40MB AT #251	899	349
40MB AT #251-1	899	449
80MB AT #4096	1199	549
Toshiba		
360K Floppy	119	69
720K 3.5" Floppy	149	79
1.2MB 5.25" Floppy	149	79
1.44MB 3.5" Floppy	189	99

Call On-Listed Items

SOFTWARE

Database

Clipper	LIST	FAST
Database	699	399
dBase IV	795	449
dBXL Diamond	199	105
Foxbase Plus	395	185
Foxbase Plus Lan	595	295
Paradox	725	429
RapidFile	295	179
Rbase for DOS	700	Call
Reflex	150	90
Q & A	349	199
Desktop Publishing		
Byline	295	175
GEM Desktop Pub.	299	169
Pagemaker 3.0	795	Call
PFS:1st Publisher	129	69
Publisher's Paintbrush	285	149
Ventura 2.0	699	489
Financial		
Bedford Integr. Acct.	249	139
BPI		
Computer Associates		
DAC 3.0	99	59
DAC Payroll 3.0	99	59
Dollars & Sense	179	99
Managing Your Money	199	117
Reckoner Complete II	199	149
Turbo Tax 1040	75	42

Graphics

Deluxe Paint II	LIST	FAST
First Graphics	129	Call
Freelance Plus	495	Call
GEM Artline	495	269
GEM Draw Plus	299	165
Generic Cadd Level 3	200	97
Graph Plus	495	299
Harvard Graphics	495	Call
Perspective Jr.	149	85
Integrated		
First Choice	159	Call
Works	149	89
Windows 286	99	59
Windows 386	195	117
Mice		
Logitech C7 Serial/Bus	119	65
Logitech HiRes Bus	150	79
Microsoft Serial/Bus	150	95
Microsoft W/ Windows	200	129
Mouse		
Mouse II Serial/Bus	149	89
Power Protection		
Circles Ruby Plus	115	59
Datsheild 85	90	50
Datsheild 100	99	57

Programming

Macro Assembler	150	
Norton Guides (Specity)	100	
Turbo Basic	99	
Turbo C 2.0	149	
Turbo Pascal 5.0	149	
Quick Basic	99	
Quick C	99	
Spreadsheet		
Allways	150	
Excel	495	
Lotus	495	
Lucid 3-D	149	
Quattro	248	
Utilities		
CoreFast	149	
Desklink	170	
Desquivio	130	
Fastback Plus	169	
FastTrax	89	
Formtool	95	
Laplink Plus	140	
Norton Advanced	149	
PC Tools Deluxe	100	
Sidekick Plus	195	
XTree Pro	129	

Word Processors

Ami	LIST	FAST
Easy Extra	99	55
GEM First Word Plus	199	117
Grammatik II	89	49
Manuscript	495	Call
Multimate Adv. II	565	247
Professional Write	199	109
Rightwriter	145	49
Spring	195	119
Q & A Write	199	109
Webster's Writer	60	47
Word	450	Call
Word Perfect	495	Call
Word Perfect Library	129	60
WordStar Prof. 5.0	495	219

Call On-Listed Items

TERMS: Most Orders Ship Within 48 hours. No Charge for Visa or MasterCard. Shipping & handling charge 3% (Min. \$4). Product warranties, offers & claims are handled by the manufacturer. All returns are subject to 15% restocking fee, call for RA number. No returns on used items. Sorry, no C.O.D.'s. Personal company checks delay shipping. Compatibility not guaranteed. Add \$15 per box. Price/availability subject to change. Add \$2.00 for 6% tax. For your protection, we check for stolen credit cards. Billing Address: 3721 E. Grove St., Phoenix, AZ 85040. To place orders only call: 800-441-3278. To check on an order call: 602-437-8975.

\$495 Employee Handbook Maker

PC HANDS ON

BY BRUCE BROWN

KnowledgePoint's \$495 *Personnel Policy Expert* takes the pain out of creating employee handbooks. The menu-driven package prompts you to answer questions about your company's policies on such topics as sick leave and termination, then produces a manual based on your answers. Text screens explain your options in depth.

Personnel Policy Expert's editor uses WordStar-like cursor-movement commands with pull-down-menu operations. You can also use your own word processor if you prefer. KnowledgePoint will print and bind your handbook for a fee, but you can print the ASCII format text on any printer, adding such

attributes as boldface and underlining, or you can create an on-line manual.

To put the product to the test, I set out to produce a hand-

book for my own small company. I created a complete employee handbook in about 6 hours—on a 4.77-MHz XT with an 80-millisecond hard disk.



Personnel Policy Expert creates an employee handbook based on your answers to questions about such topics as preemployment physical exams.

And that time included my reading every text screen.

Although written for the whole U.S. market, the package is based on California law, so your handbook should be reviewed by your attorney.

For any small business, human resources department, or management consultant (a consultant version is available for an additional \$1,000), *Personnel Policy Expert* is a time-saving, easy-to-use tool. It's also an impressive, practical application of AI-like software.

List Price: *Personnel Policy Expert*, Version 1.0, employer version, \$495; consultant version, \$1,495. Update subscription for 1 year, \$95; for 3 years, \$195.

Requires: 512K RAM, DOS 2.1 or later. Not copy protected.

KnowledgePoint, 1311 Clegg St., Petaluma, CA 94952; (800) 727-1133.

CIRCLE 431 ON READER SERVICE CARD

Practical Programming Guide for OS/2

PC BOOK REVIEW

BY ROBERT L. HUMMEL

OS/2 Programming: An Introduction, by Herbert Schildt, provides just the right mix of a clear tutorial, practical programming examples, and a reference guide to bring you up to speed on OS/2.

OS/2 Programming: An Introduction doesn't force you to wade through chapters on how neat OS/2 is before getting practical. Whether you're an experienced C programmer looking to write programs for OS/2 or a nonprogrammer who needs to know the basic facts, this book gives you the essentials without the hype.

You can safely skim or skip the first chapter's overview of the Intel 80x86 family architecture and the history of DOS and OS/2. The book gets down to serious programming in chapter 2, where Schildt presents C code you can compile and run under OS/2 immediately. With this hands-on experience you get a sense of real accomplishment. More important, you're

motivated to study the explanations that follow.

In his next ten chapters, Schildt covers advanced topics like keyboard monitors and dynamic-link libraries in the same clear, straightforward manner. As you become more experienced, you'll find the many ta-

bles in the book useful for reference. And, as a bonus for the really ambitious, a section on programming for the OS/2 Presentation Manager graphical interface is included.

Learning to program for OS/2 isn't easy. But *OS/2 Programming: An Introduction*

makes the task more pleasant and can save you hours of frustration.

List Price: *OS/2 Programming: An Introduction*, by Herbert Schildt, \$21.95; with companion disk, \$24.95. ISBN: 0-078-81427-8. Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; (415) 548-2805.

CIRCLE 432 ON READER SERVICE CARD

Smart ASCII Imports for Ventura Publisher

PC HANDS ON

BY EDWARD MENDELSON

Vtune is the ASCII-import filter that should have been built into *Ventura Publisher*. Emulation Technologies' \$99 utility is a pricey but convenient addition to the bag of tricks that *Ventura* uses when importing text that's been prepared in other word processors or text editors. *Vtune* appears on the Load Text/Picture menu along with *Ventura*'s native import filters, but it has options and features that none of the other filters offer.

Vtune converts ASCII text intelligently and according to your exact preferences. If you type (c) in your text, *Vtune* can convert it into the copyright symbol—and it does the same for the registered and trademark symbols. It can convert three periods into a correct ellipsis.

Vtune removes extra carriage returns between paragraphs, and it even converts those annoying ASCII files with carriage returns at the end of each line. If you want to convert any sequence of two spaces into an em space or three spaces into an em space, *Vtune* will do it

automatically. It can convert different combinations of dashes or underlines into en and em dashes and change fractions typed in the form 7/8 into any typographic style of case fraction that your printer supports. You also get more-intelligent and -flexible conversions of dashes and quotation marks than *Ventura* provides.

With luck, you won't need *Vtune* with the next version of *Ventura Publisher*. Meanwhile, it's an indispensable timesaver. **List Price:** *Vtune*, \$99. **Requires:** *Ventura Publisher*, Version 1.1 (with Patch 2) or 2.0. Not copy protected. Emulation Technologies Inc., 1501 Euclid Ave., Cleveland, OH 44115; (216) 241-1140.

CIRCLE 433 ON READER SERVICE CARD

Through Basic training? Graduate to Turbo Pascal.

Turbo Pascal® is easy to learn, fast, powerful, and the most popular Pascal compiler in the world.

When you graduate from Basic to Turbo Pascal, you have entirely new freedoms and powers. Modern, modular programming for one. Basic doesn't support that. Complete control over your computer's memory is another. Basic doesn't give you that.

Turbo Pascal's .EXE files are streamlined and fast, just like the pros'. And Pascal doesn't promote Basic flaws like "GOTO" that lead to spaghetti code.

None of which matters as much as the spectacular difference Turbo Pascal makes to the size and speed of your programs. Basic is big and slow. Turbo Pascal is just the opposite.

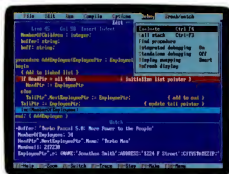
You'll like Turbo Pascal 5.0's environmental impact

With Turbo Pascal, you're in a completely integrated environment that includes source-level debugging. You can step code, watch expressions, change variables and set breakpoints. Edit, compile, run and debug.

You are not alone

We're here to help—whether on CompuServe, by phone to Tech Support or through User Groups. Borland revolutionized programming languages, made Pascal the worldwide favorite, and we're committed to supporting you. Our manuals and tutorials—unlike most others—are clear, concise, and thoroughly professional.

We also offer an extended family of Turbo Pascal Toolbox programs including source code: Runtime Library, Database Toolbox, Graphix Toolbox, Turbo Pascal Tutor, Editor Toolbox, Numerical Methods Toolbox, and GameWorks. Borland is the Pascal one-stop shop.



The integrated development environment lets you easily write and debug real programs.

Turn pro for only \$250 with new Turbo Pascal Professional

This special package—Turbo Pascal Professional—includes everything you need for professional programming in Pascal.

- New Turbo Pascal Version 5.0
- New Turbo Debugger*
- New Turbo Assembler*

Turbo Debugger, recent recipient of PC Magazine's Technical Excellence Award in the development tools category, lets you debug any size program

and have up to 12 views of your code. Turbo Assembler is much faster than MASM and more compatible with MASM than MASM is with itself. Turbo Pascal Professional: it's nothing but the best.

A fast look at 5.0

- Fully integrated development environment
- EXE files bigger than 64K
- New source-level debugger
- Demand Overlays
- 34,000 lines a minute on PS/2 Model 60
- EMS support
- RAM-resident context-sensitive Help
- Separate compilation by Units

Forget the Basics for only \$149.95

Ready to move onward and upward from Basic? You can make easy entry to Pascal with 5.0 for only \$149.95.

And if you're a current Turbo Pascal 4.0 user, you can upgrade to the new version 5.0 for \$49.95.**

To upgrade only call (800) 331-0877, or for the dealer nearest you, call (408) 438-5300.



60-Day Money-back Guarantee.*

*Customer satisfaction is our most concern. Within 60 days of purchase this product does not perform to satisfaction with our clients, call our customer service department, and we will arrange a refund. **Includes separate manual and disk for \$49.95 plus fee for CA and WA residents, and \$5.00 for shipping within the U.S. \$70.00 in Canada. All Borland products are trademarks or registered trademarks of Borland International, Inc. Other brand and product names are trademarks or registered trademarks of their respective holders. Copyright © 1988 Borland International, Inc. B-12554

Code: MA09

BORLAND

CIRCLE 137 ON READER SERVICE CARD

Corel Draw! Combines Power, Simplicity

PC HANDS ON

BY LUISA SIMONE

In a software category where powerful features and ease of use have historically been mutually exclusive on the PC, *Corel Draw!* stands as an exception. This new vector-based drawing package truly deserves the exclamation point that rounds out its name.

The first thing you notice when you open *Corel Draw!* is that the screen isn't cluttered. In fact the toolbox, which runs down the left of the display, contains only nine icons—and only three of those are actually drawing tools.

At first, this may seem to be a drawback. But you soon discover that you can achieve sophisticated, professional-looking drawings without lots of icons, gizmos, menu choices, and dialog boxes.

Where other drawing packages give you four different tools for drawing four different types of lines, *Corel Draw!* gives you a pencil. If you click the mouse button and release it, and then move the mouse and click again, the program assumes you want straight lines. If you move the mouse while holding the button down, the program assumes you want curves.

Moreover, *Corel Draw!* decides how best to fit the curves to the movements you've made. By having the program do the hard work—like deciding whether a cusp curve is better than a symmetrical curve—the act of drawing becomes easier.

Of course you can edit any straight line or bezier curve. In fact, double clicking on a curve pops up a special menu to do just that.

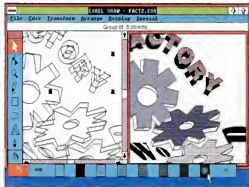
The power of the tools makes special effects incredibly easy. For most special effects, it isn't even necessary to go to a menu. Double-click with the Pick tool turned on and, bingo, you can rotate or skew objects to simulate 3-D. Text can appear to be lying flat on a page. Creating a mirror image of an object

requires exactly two mouse clicks and one keystroke. To tint a circle so that it looks like a sphere, you simply choose the Radial Fill option from the toolbox.

Corel Draw! runs under Microsoft Windows and takes advantage of all the screen and

character mode. It's fast because you don't have to kern and justify type on the fly. And it's logical because the same window contains all of your type specs for that piece of copy.

The package includes about 50 proprietary font outlines and,



To avoid slow screen redraws, *Corel Draw!* presents a wire view for drawing creation and editing. A separate preview window lets you see the finished result.

printer drivers available in Windows—including PostScript printers and the HP LaserJet. However, this product isn't entirely Windows kosher. I found that the screen sometimes failed to redraw properly—especially if I printed a file at a reduced percentage.

The program uses the windowing environment to segregate your working wire frame drawing from an on-screen WYSIWYG preview. It's a trade-off. The wire frames, which represent only the outlines of objects, are redrawn very quickly, but the preview window eats into precious screen space. I can't say that I liked the trade-off, but I found it workable.

Corel Draw! uses a similar windowing method to much better effect for text entry. Anyone who has ever typed a text correction into a WYSIWYG program knows how frustratingly slow the process can be. *Corel Draw!* brings up a separate dialog box that lets you enter a text string of up to 250 characters in—you guessed it—

though the names are unfamiliar, the letter forms themselves closely resemble standard Adobe typefaces.

The text handling features are nothing short of elegant. You can assign special attributes, like typeface and point size, to individual characters within a text string. You can convert text into curves and then edit the outlines to suit your fancy. You can rotate and skew text or fit it to a curved path. These features rival those of some of the best freehand drawing programs on the Mac.

The feature list goes on (and on). *Corel Draw!* can automatically trace a scanned, bit-mapped image. I was able to trace a complex outline of Chinese calligraphy from an imported .PCX using two simple tools—Pick and Shape.

In addition, *Corel Draw!* makes it painless to change the line width and color attributes of the drawing tools. You can, for example, simulate pen nibs of different shapes by altering the rotation of the line. Objects can be filled with patterns or with

color. *Corel Draw!* accommodates both the Pantone Matching System (PMS) and the 4/c process model (CYMK).

Only one change could make these customization options better: the ability to save one or two (or three or four) favorite custom tools so that they would be available as menu choices.

Corel Draw! imports and exports files in many useful formats, including .PCX, .TIF, Windows Metafiles (.WMF), and Encapsulated PostScript (.EPS). However, the addition of the .CGM and HPGL formats couldn't hurt.

My only serious problem was a bug in the program. Take my advice and never include the end nodes of a line when you convert straight lines to curves—the program crashes every time. The tech support staff at Corel Systems was aware of the bug and assured me that a fix is on the way.

I suspect that illustrators, art directors, and desktop publishing mavens will be the most likely candidates to use *Corel Draw!*. But, by concentrating not only on the quality of the bezier curves but also on the ease of the learning curve, this program holds out hope for all aspiring artists.

PC FACT FILE

Corel Draw! Version 1.0

Corel Systems Corp.
1600 Carling Ave.
Ottawa, Ontario K1Z 8R7
Canada
(613) 728-8200

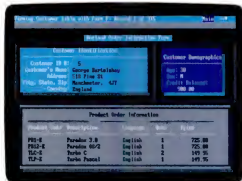
List Price: \$495 (does not include a runtime version of Microsoft Windows).

Requires: 640K RAM; Microsoft Windows 2.0 or later; Windows/286, or Windows/386; IBM PC AT or compatible (2MB hard disk space); DOS 3.0 or later.

In Short: A walloping good freehand drawing program that is easy to learn and fun to use. Highly recommended. Not copy protected.

CIRCLE 443 ON READER SERVICE CARD

Power without pain.



Multi-table form dynamically displaying information from three related tables.

You don't have to be a programmer to have easy access to our highly sophisticated, powerful relational database, Paradox® 3.0.

Paradox 3.0 is all powerful and never painful because it makes all the complex inside moves, you don't. While it does the complex for you, the complexity is hidden beneath clear, natural, even intuitive pathways and patterns that make life easy for you.

With Paradox 3.0, there are no Unclears, no Unknowns. You don't need an army of in-house technical support people. And best of all, you *don't* have to be a programmer to be a pro with Paradox. It's all gain, no pain.

✓ "Query-by-Example" for example

Use this checkmark and you're using QBE. It's that easy. Let's say you need to know in a hurry which of your Los Angeles customers bought more than 5 pairs of white shoes. First ✓ the customer field, then type "LA," "white," and ">5," and you're done. Paradox gives you the right answer right now. And how much programming to do all that? Zero.

If your database experience so far is limited to the flat-file type rather than relational, or even if a

spreadsheet is the only program you've used before, Paradox gets you up and running immediately with just a ✓.

Record-locking and Auto-Refresh make the network safely network

Paradox has become the leading networker because it handles multi-users intelligently. If someone in your group or network has accessed a record, automatic record-locking keeps everyone else from changing it.

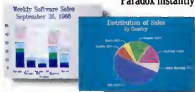
That way, two or more people can't change the same data at the same time. (As a bonus, Paradox also tells you *who* is using a record at a particular instant.)

Once the record has been changed by someone in the network, *Auto-Refresh* kicks in *automatically* and updates everything. Everyone in the network is looking at up-to-the-minute information.

Paradox, for the looks of things

Presentation-quality graphics are another Paradox distinction. They give you and your work the professional look.

Paradox instantly turns your tables into graphs with *one* keystroke—and in multiuser environments, with a few keystrokes your graph can show up-to-the-minute changes. Not only does everyone get the picture, they get an accurate picture.



Award-winning Paradox Family

Paradox 3.0 is the latest addition to the award-winning Paradox Family. Paradox OS/2 and 386 received PC Magazine's BEST OF 1988 AWARD in the database category.

✓ it out

To order a trial version of Paradox 3.0 (\$14.95) or a demonstration disk (\$4.95), call (800) 345-2888, extension 100. Paradox owners may upgrade (\$175.00) by calling (800) 331-0877. (Please have your serial number available.)



60 day money-back guarantee*

*Customer satisfaction is our major concern. If within 60 days of purchase this product does not perform to satisfaction with you, return it with our money-back guarantee. All Paradox products are trademarks or registered trademarks of Borland International, Inc. Other brand and product names are trademarks or registered trademarks of their respective holders. Copyright © 1988 Borland International, Inc. 10-107

Code: MP24

BORLAND

Why Our Engineers Love Smashing Windows.

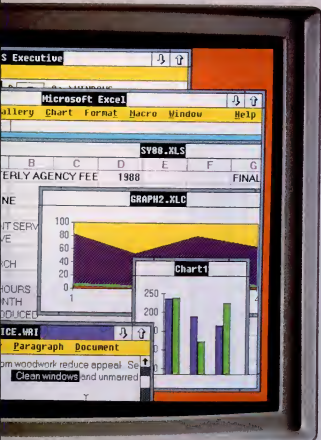
When Windows looks smashing, our engineers look happy. Because that's when their hard work really shows.

Take the CM-1430 monitor, for example. Its 1024x768 resolution lets you see more data, even when the active Window area shrinks. Use of one electron gun instead of three keeps colors intense, and in focus. Its cylindrical tube (rather than a round or flat one) makes screen edges razor sharp, and reduces glare. And, its tight 26mm dot pitch keeps lines sharp, type crisp.

Add obsolescence protection (compatibility with both VGA and 8514/A standards) and you're set for a stunning display of today's best software. As well as tomorrow's.

The net effect is a screen unmatched in clarity, precision, and beauty. And unapproachable in value. Give us a look. You'll see how our engineers' view of technology actually improves your view of Windows. And everything else.

Call 1-800-888-0817 Ext. 100C for information and a dealer near you.



CM-1430

Seiko Instruments



Seiko Instruments ●

PC UPDATE

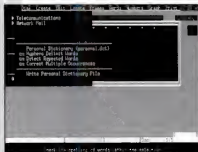
by Paula Seefeldt

**SuperCalc5
Links
Spreadsheets**

Computer Associates International has added spreadsheet-linking abilities to *SuperCalc5*, its spreadsheet program. Version 5.0 also provides auditing and debugging, improved graphics and output, and LIM 4.0 support. *SuperCalc5* works with *Lotus 1-2-3*, enabling the user to mix commands and use 1-2-3 macros and menus. Users who subscribe to Computer Associates' SupportPlus service will receive a free upgrade. All other registered users and users of competitive spreadsheets can upgrade for \$100. New packages retail for \$495. Computer Associates International Inc., San Jose, Calif.; (408) 432-1727.

**Framework III
Increases
Memory**

Framework III, the decision-support package from Ashton-Tate, has increased its speed and provides 50K additional free memory. Version 1.1 also has an integrated thesaurus, spelling checker, direct import and export of *dBASE*



Framework III provides a spelling checker.

files, and data entry typing. New spreadsheet features include regional recalculation and the ability to view multiple spreadsheets simultaneously. Upgrades are free to all registered users, and new packages retail for \$695. Ashton-Tate Corp., Torrance, Calif.; (213) 329-8000.

**WordStar 5.5
Adds Pull-
Down Menus**

WordStar, the word processing program from MicroPro International, now provides comprehensive connectivity with other packages as well as LAN and graphics support. Version 5.5 refines the Advanced Page Preview feature by allowing users to view documents on-screen and adds Systems Application Architecture pull-down menus. MicroPro is also introducing a Corporate Support Program, which includes volume purchase and site licensing agreements and separate documentation pricing. Upgrades are \$39 for users of *WordStar 5.0* and \$119 for all other users. New packages are \$495. LAN upgrades from Version 4.0 are \$119, and new LAN packages retail for \$695. MicroPro International Corp., San Rafael, Calif.; (415) 499-1200.

**PFS:First
Publisher
Incorporates
DeskMate**

Software Publishing has released a color-enhanced version of *PFS:First Publisher*, its desktop publishing package. The new version runs under *DeskMate* and supports VGA and the Tandy PL 1000 laser printer. Registered us-



PFS:First Publisher runs under DeskMate.

ers can upgrade to *PFS:First Publisher-DeskMate* for \$45. New packages retail for \$149. Software Publishing Corp., Mountain View, Calif.; (415) 335-2080.

**Dolch P.A.C.
Increases
Speed**

Dolch Computer Systems has added a 25-MHz zero-wait-state microprocessor to the *Dolch P.A.C.*, its 386 portable computer, for increased speed. In addition, the enhanced *Dolch P.A.C.* includes a 64K disk cache and an SCSI interface with an Electroluminescent flat-panel display, to provide a wide range of ambient lighting. *Dolch P.A.C.* retails for \$9,495. Dolch Computer Systems, San Jose, Calif.; (408) 435-1881.

**AccountMate
Works with
dBASE IV**

SourceMate Information Systems has added *AccountMate*, Version 2.0 Plus IV, to its integrated *dBASE* accounting software. Version 2.0 Plus IV provides compatibility with Ashton-Tate's new *dBASE IV* database language as well as *dBASE III Plus*. Prices for the new *AccountMate* modules range from \$295 to \$895. SourceMate Information Systems, Mill Valley, Calif.; (800) 877-8896.

**Micrografx
Designer Adds
OS/2
Compatibility**

Micrografx Designer now provides compatibility with the OS/2 Presentation Manager. Version 2.0 also offers automatic gradient fills, auto-trace, bezier-curve editing, and spot- and process-color separations. New Import and Export graphics filters are available, and crop bit-map and mirroring are included. Version 2.0 is free to Micrografx ETSS subscribers and to users who purchased after February 1, 1989. Upgrades are \$100 for all other registered users. New packages are \$695. Micrografx Inc., Richardson, Tex.; (214) 234-1769.

BULLDOG'S HUNTING UP DEALS FOR YOU!



COMPAQ

386 Desk Pro 40/60/130	
\$3950/4895/6289	
286 Desk Pro 12 mhz	1649
Compaq II Model IV	2879
Compaq Port 386	
Model 40/100	5649/7199
Compaq III 20 mb/40mb	
	3595/4150
Compaq 386-S model	
1/20/40	2925/3465/3695
Compaq 386-25 110/300	
	7195/9395
Compaq SLI w/20 meg	4395
Compaq SLI w/40 meg	4750
90 day warranty through Bulldog	

IBM

PERSONAL SYSTEM/2	
Model 30 w/1 floppy	\$1310
Model 30 w/1 floppy & 20 mg	
	1725
Model 50 - 30/60	2750/3450
Model 60 - 40/70	3295/3650
Model 70 - 60	4325
Model 80 - 40	4270
Model 90 - 70	4875
Model 80 - 115	6195
90 day warranty through Bulldog	

MATH CO-PROCESSORS

80387-25	\$799
80387-20	439
80387-16	385
80287-8	219
80287-10	259
8087-3/8087-2	99/139
286K Chips/64K Chips	Call

MONITORS

NEC	
NEC Multisync II A...	\$519
NEC Multisync II B...	589
NEC Multisync Plus	879
NEC Multisync XL 19"	2199
IBM	
Mono 8503	\$209
Color Display 8512	459
Color Display 8513	559
Color 8514	1195

PRINCETON

MAX12	\$149
HX12	419
HX12E	499
Ultrasync	529

MAGNAVOX

Amber 776	\$89
RGB80 877-2	259
EGA 9CM053	369

AMDEK 410W	\$199
------------	-------

COMPATIBLE

8 MHZ TURBO	
1 floppy, 512K, AT style keyboard, monographics card, mono monitor	\$799
Color System add \$150 w/20 mb add \$269, w/30 mb add \$289	
90 day warranty through Bulldog	
286 BUILDING 10 MHZ	
1 mb Ram, 1.2 floppy	\$1095
Building 386 16 mhz, 1 mb Ram, 1.2 floppy	\$1795
AST	
AST Premium 286 Model 80, 10 mhz, 0 wait state, 512K, DOS key-board, 1.2 floppy	\$1395
AST Premium 386 Model 300 20 mhz, 1.2 floppy, 1 mg, DOS, keyboard	\$2675
All AST computers carry a 1 year warranty	

LAPTOPS

Epson Laptopell	CALL
NEC Multisync EL	\$1549
NEC Multisync HD	2299
Toshiba 1000	825
Toshiba 1200	2299
Toshiba 1204S	1395
Toshiba 1310	3095
T3200/T5100	3745/4795
Zenith Super Sport 20 mb	2325
Zenith Super Sport 286 20 mb	3399

DRIVES

Seagate 20 dmb w/contr	
ST225	\$259
Seagate 30 mb w/contr	
ST238	279
Seagate 40 mb for AT	409
ST251-1	
Seagate 40 mb for AT	409
ST251	
Seagate 80 mb ST409C	349
CMS 5 1/4" ext 360K for PS/2	215
CMS 5 1/4" ext 1.2 mb for PS/2	239
Pacific Rim 5 1/4" ext 360K for PS/2	179
Pacific Rim 5 1/4" ext 1.2 mb for PS/2	199
Toshiba 3 1/2" 720K int.	89
Toshiba 3 1/2" 1.44 mb int.	105
Toshiba 5 1/4" 360K int.	85
Toshiba 5 1/4" 1.2 mb int	99
Bermco Box II 5 1/4"	
20 mb int.	955
20 mb ext w/card	1195
dual 20 mb ext w/card	1769
Plus Hard Card 40	669
Plus Hard Card 20	525
Prism 60 mb AT	629
Prism 43 mb AT	469

MICE & MISC

Microsoft Mouse w/windows	\$135
Microsoft Mouse w/PC	
point brush	99
Mousesystems Mouse	89
Logitech Mouse CT Plus/Hi Res	69/89
Logitech Scan Man	199

PRINTERS

EPSON	
LX 800 180 CPS, 30 NLQ	\$174
LX 850 264 CPS, 54 NLQ	339
FX 1050 264 CPS, 54 NLQ	429
LQ 1050 330 CPS, 60 NLQ	279
LQ 850 330 CPS, 88 NLQ	519
LQ 950	589
LQ 1050 330 CPS, 88 NLQ	519
LQ 2550 400 CPS, 108 NLQ	929
OKIDATA	
182 Plus 180 CPS, 30 NLQ	229
320/321 300 CPS, 62 NLQ	339/465

390 24 pin 270 CPS, 90 NLQ	639
391 24 pin 270 CPS, 90 NLQ	465
292 240 CPS, 100 NLQ	439
293 Plus 240 CPS, 100 NLQ	575
393 450 CPS, 120 NLQ	995
TOSHIBA	
321 SL 216 CPS, 72 NLQ	469
351 SL 350 CPS, 100 NLQ	950
341 SL 216 CPS, 72 NLQ	589
311 Express	389
NEC	
2200	359
5200	519
5300	669

PANASONIC	
1124	339
1080 Model II	179
1091/1092 Model II	189/329
1524	549
1592/1595	399/439
3131/3151	315/359

HEWLETT-PACKARD	
Laser Series II	1695
Desk Jet	749
Print Data 1 mg/2 mg	309/615
Print Data 25 N-1	269

IBM	
Proprietary X24	615
Proprietary XL 24	799
Proprietary III	495
Proprietary III XL	589
6 foot parallel cable	\$19

GRAPHICS CARDS

Everex Micro Enhancer	\$149
Genoa Super Hi Res	199
Genoa VGA 5100/5200	239/359
Hercules Graphics	219
Hercules in Color	181
Orchid 800 VGA	229
Orchid Pro Designer w/256K	279
Orchid Pro Designer w/512K	399
Paradise Auto Switch 480	179
Paradise VGA Plus	265
Paradise VGA Professional	479
STB Chaffeur HT	135
STB Multi Res II	169
Vega Deluxe	189
Vega VGA	265
Vega Fastwrite	339
Vega V Ram	495

SOFTWARE

Aldus Pagemaker 3.0	\$465
Charmsizer	205
Clipper	419
D Base IV	499
DEML	125
Enable 2.0 w/Perspective	370
Fastback Plus	105
Foxbase +	189
Freelance Plus	329
Framework III	439
Harvard Graphics	275
IBM Display Write IV	269
Lotus	289
Microsoft Word 4.0	209
Microsoft Excel	279
Multimate Advantage II	269
Poachtree II Complete	149
PFS Pro Write	119
PFS Pro File	169
Paradox 3.0	475
R Base for DOS	439
Revelation	469
Super Calc IV 1.0	285
Symphony 1.2	419
Ventura Desktop Publ.	489
Word Perfect 5.0	219
Wordstar 2000 + 3.0	239
Wordstar Pro 5.0	239

TAPE DRIVES

Everex 60 mb	\$550
Archives 40 mb int	269
CMS 150 mb internal	785
external	825
Mayntstream 60 PS/2 w/card for model 50, 60 & 80	869

MULTI-FUNCT. CARDS

AST Advantage w/128K	\$229
AST Advantage Premium w/512K	395
AST 6 Pack Plus w/384K	245
AST 5251-11 + Enhanced	559
AST Rampage 286	385
AST Rampage 286-2 for Model 50/60	549
AST Hotshot	355
Everex Mini Magic w/ K	59
Fast 88/V20 w/switch	89
Intel Above Board w/512K	399
Intel Above Board PS + w/512K	449
Intel Inboard 386 w/adaptor	1075
Intel Inboard 386 for PC w/mb	799
Intel Above Board II Plus PS/2 w/K	289
Irma Board II	685
Logical Connection 256/512K	449/519
Orchid Ramquest Extra w/K	279
Orchid Ramquest XT/AT w/K	239
Orchid Tiny Turbo	259
Orchid Ramquest II Z w/K	169
Orchid Twin Turbo	349

MODEMS

Everex 1200 int/ext	\$79/115
Everex 2400 int/ext	139/169
Hayes 1200/2400	279/419
Magent Pocket Modem	89
Practical Phonebank half card	
2400 w/Procomm	159
US Robotics 2400/9600	139/619
Supra Modem 2400 ext	135
Ventel Half Card 2400	
Ventel 1200/2400 Plus	239/359

Policy: All 24 minimum \$10 shipping and handling. Larger items may require additional charges. Personal and company checks require 2 weeks to clear. For better checks, use a VISA card. All orders are subject to credit review. All orders are subject to change without notice. All items are subject to availability. Software licenses will be required with the same terms. Hardware will be reduced or required at our discretion within the same and units of the manufacturer's sales. We are not responsible for shipping. All items are final and returned shipments are subject to a restocking fee. All orders may be shipped in 24-48 hours for a fee. For more information, call 800-438-6039.

Sales Hot Line 1-800-438-6039



BULLDOG

COMPUTER PRODUCTS

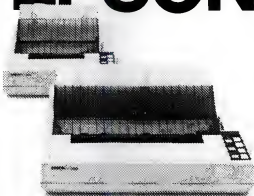
3241-E Washington Road • Martinez, Georgia 30907

For information, technical, shipping or returns call:

(404) 860-7364 or (404) 860-6905

We accept VISA, MasterCard, American Express

EPSON®



FX-850 & FX-1050

Epson's FX printers are legendary in the computer products industry. The FX-850 and FX-1050 continue Epson's long tradition of quality, performance and reliability. Now with increased speed and advanced features, the legend grows stronger.

Paper-Handling Performance.

The narrow-carriage FX-850 and wide-carriage FX-1050 are equipped with Epson's SmartPark™ feature that lets you switch paper types without removing hardware or paper.

Built-In Convenience. Epson's SelectType front control panel puts popular printer features at your fingertips.

High-Speed Productivity. Both print 264 characters per second (CPS) in draft mode; 54 CPS in Near Letter Quality.

Backed by the Leader. Like all Epson computer products, the FX-850 & FX-1050 printers are supported by a nationwide service network and backed by Epson's one year limited warranty.

EPSON®

WHEN YOU'VE GOT AN EPSON,
YOU'VE GOT A LOT OF COMPANY.™

Epson is a registered trademark of Seiko Epson Corporation.
SmartPark is a trademark of Epson America, Inc.

Prices Subject To Change

For Orders Call: **1-800-438-6039**



BULLDOG

COMPUTER PRODUCTS



For information, technical, shipping or returns call: **(404) 860-7364** Or **(404) 860-6905**

CIRCLE 481 ON READER SERVICE CARD

COMMUNIQUE

Bill Howard

To Keep Costs Down, Public-Domain Software Makes Do with Plated Silver

"Platinum, a scarce and expensive metal, is used as a purifying agent in auto emissions-control equipment. The devices account for about one-third of the world's platinum demand. Platinum is also used in jewelry and computer software."

—AP story in the *Missoula (Mont.) Missoulian*, December 21, 1988



"EXCUSE ME MAM—ROYAL CANADIAN MOUNTED PROGRAMMERS—SOMEONE HERE REPORT A MISSING FILE?"

Lucky for Us the Disks Aren't Copy Protected

"To qualify [for the SuperCalc 5 academic upgrade], the user needs to mail the title page of his or her current spreadsheet manual, the disks themselves (or a photocopy thereof), and proof of university enrollment or affiliation to the company."

—Academic Computing, November 1988

Portables work wonders these days. Clockwise, from top left:

- Toshiba laptop computer talks to CPUs, printers (\$1,250).
- Designer calculator from Texas Instruments does basics, looks chic, runs on solar in any light (\$25).
- Franklin's spelling corrector—vague at-



Why PC Magazine doesn't publish recipes and decorating tips (because we're not qualified): "The Mighty Minis" article in *Better Homes & Gardens* (December 1988) succinctly summarizes portable computer technology.

The Cause Is Pretty Straightforward And It Has Nothing to Do with VDTs (Even Better Homes & Gardens Knows That)

"An association between intensive VDT use and first-trimester pregnancy was established, said Michael Polen, co-author of the Kaiser-Permanente study. 'But we didn't have information to say what might have caused that.'"

—Digital Review, November 21, 1988

But Who's Counting?

"Objects are the latest buzz word. For a long time, there was only Smalltalk, now there's a whole troupe [sic] of players including Actor, Objective C and C++. So we start out this issue with a four-piece trilogy on objects: complete with theory, examples and projects. (Space is no object.)"

—Micro Cornucopia (November-December 1988)

When You Come Right Down to It, Maybe Scroll Bars Aren't Such a Hassle

"How to get a full-page display in Ventura Publisher for \$69: By enabling your EGA/VGA board to store a full-page image of your document, The Soft Kicker gives you instant access to any part of that page. All you have to do is move your house. No more hassling with scroll bars."

—Aristocad Inc. postcard flyer

A little knowledge is a dangerous thing: Nice try by the caption writer for the *Financial Times* of Canada (October 17, 1988). The phrase has previously been applied, more correctly, to Bill Gates.



Next Jobs: New tricks from the wizard of DOS

Have you seen anything offbeat, unusual, or just plain dumb about the computer industry? If so, then send submissions to *Communique*, PC Magazine, One Park Avenue, New York, NY 10016. Contributors whose entries are used will receive \$50 and a PC Magazine T-shirt. In case of duplicate entries, the earliest postmark will prevail. Winners this issue include: Lane Coddington (platinum software), A. J. Boron (wizard of DOS), Mark Blaskey (laptop talks to CPUs), Thomas Hodges (first-trimester pregnancy), Greg Stricker (four-part trilogy), Ken Lerner (move your house), Marc Kestler (photocopy thereof).

GREAT GANTTS.

Lotus-like menus give Time Line a familiar-looking face, which makes it easier to learn... and easier to work with.

Display your schedule
in years, months, weeks,
days, hours, minutes... any
way that helps you clearly see
the *turnout* of your project.

Time Line's flexible outline structure puts you in control. Collapse the entire schedule, to see "the big picture." Or expand a section to focus on details.

Four filters make it easy to view selected information, such as "Joe's critical tasks."

For easy reference, the status column flags tasks that need special attention—like critical tasks or resource conflicts.

Your project's end date always shows on-screen. So, whenever you make a change, you'll immediately know how it affects the end result.

See the impact of any changes you make immediately in the resource histograms. Thus, and Time Line's Undo/Redo feature makes playing "what-if" an exact science.

It's easy to see progress, indicated by the broken portions of the task bar.

Changes are automatically reflected throughout your schedule. You get the power to quickly find and fix conflicts, before they become real problems.

Customize your Gantt
with up to 16 data columns,
from 60 options. That way,
the Gantt chart fits the way
you work. Perfectly.

You can't manage what you can't see. That's why virtually every aspect of Time Line's project management Gantt chart is customizable. It lets you move, shift, and redefine any aspect of the schedule to see exactly what you need. Exactly when you need it.

Great Gantt's. Just one reason Time Line is used by 48 of the Fortune 50. And is rated #1, review after review. * Call for a free demo disk today. You'll see how Time Line Gantt's your every wish.

FREE DEMO DISK. CALL (800) 228-4122 Ext. 565P!

The #1 Project Manager



Winner of every major award for project management. Time Line was also noted #1 in PC Week's Customer Satisfaction survey.

SYMANTEC™ Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014, 408/253-9600

*Time Line is the #1 best-selling project manager (Survey of National Distributors). It also received InfoWorld, PC Magazine and Software Digest's highest 1989 ratings for project management programs. *In Canada call 800-228-4122 Ext. 565. Training and consulting services available, call 415-698-1919. © 1989 SynGene Corporation.

CIRCLE 249 ON READER SERVICE CARD

Graduate From Harvard.



"Graph Plus is an all-in-one business presentation powerhouse...in both drawing and chart/graphics realms."
PC Magazine - "Best of 1988"



*Buy Micrografx Graph Plus and get \$100 cash back.**

In the real world you need more than just a degree to make things happen. Fast and effective communication is the key. Graph Plus™ is the answer.

If you can use a mouse, you already know how to use Graph Plus. It has more chart types, more drawing tools, and greater flexibility than Harvard Graphics. Import data from any program. Point. Click. It's quick *and* easy. Paste your chart into other programs, from desktop publishing

applications and word processors, to spreadsheets and databases.

Join the Harvard Graphics alumni and graduate to Graph Plus. Send us your Graph Plus registration card and Harvard Graphics, and we'll send you \$100.*

Think of it as your graduation gift.



MICROGRAFX

1303 Arapaho • Richardson, TX 75081 • 214/234-1788 • 800/272-3729
Survey House • 34 Eden Street • Kingston, Surrey • 01-547 1638

*\$100 offer good for Harvard Graphics, Fairview Plus, ChartMaster, and many others. Call for details. Micrografx Graph Plus is a trademark of Micrografx, Inc. Harvard Graphics, Fairview Plus, ChartMaster are trademarks of their respective manufacturers. GPC4.1

■ BILL MACHRONE

WHAT CAN THE MAC TEACH US?



As Macintosh developers port their magic to the Presentation Manager, a look down the aisles of Macworld Expo is like gazing into a crystal ball. 1990 looks good for the PC.

I'm a glutton for punishment. I attended the recent Macworld Expo in San Francisco to get a fix on the state of the Macintosh art. What I got was a lot of abuse. Everyone who knew me or recognized the *PC Magazine* logo on my lapel had the same refrain: "What-samatter, Bill, have you finally found out that computing can be fun?"

Indeed, computing on a Macintosh can be fun. It can also be cute, or tedious, or precious. But whatever else it is, it's intensely visual. Some Macintosh programs have no parallel on the PC and aren't likely to for some time to come.

One of my favorite examples is *Digital Darkroom*, from Silicon Beach Software. This brilliant program lets you take scanned photographic images and manipulate them to your heart's delight. You can combine, clip, burn in, dodge, hold back, sandwich, and retouch images. You can proof your handiwork on a laser printer and print it on a phototypesetter. It's one more reason why Macintosh dominates desktop publishing. But, like any other vertically oriented package, if you have to ask "What would I use it for?" you don't need it.

I also saw a number of full-motion video products, in which images from laser disks and videocassettes can be combined with computer graphics on the screen. One of the most interesting is MacroMind's *Director*. It offers video images combined with painted images, graphics from other programs, text, and digitized sound. It animates objects, allowing you to rotate in several axes, zoom, pan, and otherwise

make them jump through hoops. The results are presentation graphics, desktop video presentations, and instructional programs, the likes of which normally require a \$100,000 video-editing facility. Sure, there are half a dozen videodisk systems available for the PC, but none with *Director*'s versatility or authoring capabilities.

It's become abundantly clear that no computer is a success unless it succeeds in the business market. All of the Commodore Amiga's video prowess doesn't amount to a hill of beans beyond the TV and video graphics fields, because the Amiga isn't regarded as a business computer. The Macintosh wasn't at first, either. The original 128K Mac was an incredibly limited machine, not unlike the original 64K PC. But IBM designed the PC to be expandable, whereas it took a veritable revolution at Apple to make the Mac into a business machine.

Now, with its graphical leadership,



Macintosh is the bellwether for the applications we'll ultimately see on the PC. One key area will be forms processing. Paper isn't going away. Rather than ushering in the era of the paperless office, the computer has generated far more paper than ever. But it's also revolutionizing the seemingly mundane world of forms processing. We'll soon be taking an in-depth look at forms processing in *PC Magazine*. Forms will be with us for the foreseeable future. So the best thing that computers can do is accommodate them. That turns out to be considerably more subtle and tricky than one might expect. The trick isn't so much to represent accurately how the form looks on the screen but to simulate how the form is actually used.

A perfect example is *MacInTax*, by SoftView, currently the most popular Mac-based tax package. This program starts with a reasonable simulacrum of a 1040 form on the screen. The familiar look is important; you can relate to it (with fear and loathing, perhaps) immediately. But that's where the similarity ends. A double-click almost anywhere on the form gets you help about that part of the form. You document entries that are actually subtotals of other figures in windows that open up to show you itemization sheets or other parts of the form. *MacInTax* performs validity checks so that you can't, for instance, take a spouse-related deduction if you've checked "single" elsewhere on the form.

To date, much of the forms-processing software has centered on scanned images of existing forms and making the blank areas editable on the screen. SoftView

"RAM-Resident" Is No Longer A Dirty Word.

Remove, Replace, Even Deactivate RAM-Resident Programs Without Rebooting Your System!

If you use RAM-resident programs such as spell checkers, desktop organizers,

Other products gobble up to 40K of your precious memory. PopDrop provides

a complete RAM management system with power and flexibility while occupying only 0.6K for the first layer and 0.2K for additional layers.



print spoolers and keyboard macros, you know these "pop-up" programs provide convenience and enhance productivity.

The problem is managing them. Some create memory or keyboard conflicts and therefore can't be loaded with others, while some gobble up so much memory that you can't use anything else. PopDrop solves these problems by allowing you to actually remove, replace, even deactivate RAM-resident programs—without rebooting your system!

PopDrop will support expanded memory (EMS), so you can manage the "new-generation" RAM-resident programs like *Sidekick Plus*, *WordPerfect Library* and *VCACHE*. And PopDrop also allows easy removal of popular network software.

Voted one of "The Best Of The Best Utilities" by *PC Magazine*, PopDrop is an invaluable PC tool.

PopDrop Divides Your RAM Into "Layers"

PopDrop works by dividing your memory into layers (up to 16), each of which may contain several programs. After loading DOS and your application programs, RAM-resident programs are loaded with these layers between them, the most permanent at the bottom, the least permanent at the top.

You can create batch files to remove layers one at a time, or several at once.

Available on 5 1/4 inch or 3 1/2 inch diskettes. It is compatible with IBM PC or compatible and the PS/2. VISA, MasterCard or AMEX accepted. Add \$4.50 for shipping. Florida residents add 6 percent sales tax. International orders add \$10.00. Please include street address—no P.O. boxes please.

BLOC Publishing

Copyright 1989, BLOC Publishing Corp. PopDrop is a registered trademark of BLOC Publishing.

800 SW 37th Ave., Suite 765, Coral Gables FL 33134
See Your Dealer Or Call (800) 888-2562 To Order



PopDrop Keeps Tabs On Your Memory Usage

Our unique "PopView" screen feature displays exactly how much memory is being used—you'll never see another "Insufficient Memory" message.



The PopDrop "PopView" screen. From here, you can see which programs are loaded, how much memory each consumes, and how much is free.

Control Your RAM

If you want to run a RAM disk, a print spooler and one or more pop-up programs most of the time, but need them out of the way to work on a large spreadsheet, you can do it easily with PopDrop. You can also "activate" and "deactivate" programs in a specified layer of RAM that may conflict with the program you're using.

Ask your dealer for...

PopDrop™
Just \$49.95

■ BILL MACHRONE

president Kathy Lane says, "It's much more important that a form look the way the user expects it to look than be a slavishly accurate copy of the original." She elaborates on the point, adding that the form has to act the way the user expects it to act, as well. "The 1040 is a perfect example of a form that requires you to jump around, turn it over, use different parts of the form. The computer can do that far better than paper." And so it does.

THE PC PERSPECTIVE The more obdurate among you are wondering, "What does this have to do with me? All my applications are character-based." Not for long.

SoftView, for instance, already offers a Windows-based version of *MacInTax*, called *TaxView*. The *Windows* product is certainly a competent performer on fast machines. It's effective but somewhat slow on 8-MHz ATs and slower machines.

Products like *PageMaker* are virtually indistinguishable in their Mac and PC versions. Everywhere I went at Macworld Expo, people spied my *PC Magazine* badge and whispered, "We've got a Presentation Manager version of this in the works." Why so furtive? Because Macintosh users generally believe that PC users are a benighted lot and that developers who waste their time on the PC are turncoats.

Developers, however, are inexorably pulled toward the PC market. They see the incredible size of the installed base, the growth rate, and the increasing number of machines that are graphics-capable. This last point is the most critical. The average machine going into business today is an 80286 with VGA graphics, a meg or two of memory, and a hard disk. Yet obstacles remain. Memory is still a factor—the Presentation Manager really wants 3 or 4 megabytes, so users will still have to buy more.

Once the constraints of DOS and *Windows* are lifted, however, the designers will be free to port applications or to use their Mac feature-sets as the templates for new, PM-optimized programs. 1990 will be the go-ahead year for the Presentation Manager, the year when the seeds planted in the Macintosh market will bear fruit.

After all is said and done, the improvement will be graphically clear. ☐

Introducing Lucid 3-D. Version 2.0!

A Remarkable New
Spreadsheet
at a Familiar
DacEasy™
Price!

\$99.95
(Suggested Retail Price)

HomeOffice
COMPUTING
★ EDITOR'S PICK ★

1987 Winner



Application Software

Version 2.0 of Lucid 3-D is more than a bag of new features. It's a masterpiece! The original Lucid 3-D captured the industry's attention with its simple to use, yet remarkable three dimensional capabilities. Last year's winner of PC Magazine's Award for Technical Excellence, Lucid 3-D is fast, even on a 256K, 8088 computer. Lucid 3-D is the super spreadsheet that doesn't require a super computer!

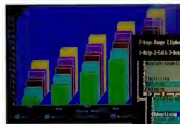
DacEasy is proud to produce this leading edge product. Its innovative design allows first time users to learn quickly while power users of other spreadsheets move to our advance features effortlessly. The Lucid 1.0 featured pull-down menus, optional instant command keys, multiple windows, a notepad in every cell, optional ram, total

"Lucid is a spreadsheet for our times. It is technical tour de force in an era that seems to have forgotten how to write tight code." PC MAGAZINE

"You might think that a RAM resident spreadsheet would necessarily be limited in features. We found that Lucid 3-D is anything but limited in power." INFOWORLD

"Lucid 3-D is a package that could alter the face of future spreadsheets. It offers residence, multiple windows, colour, mouse support and rapid execution." PC USER

Version 2.0 is Even More Amazing!



Create bar and pie charts, line graphs and more, directly from your spreadsheet.



You can open unlimited windows (up to nine on a screen) in different directories, drives, & 3-D levels.

mouseability and both a reference and tutorial manual. These features alone make this spreadsheet a must buy at only \$99.95. It's no wonder Lucid 3-D was voted Editors' Pick for 1988 by Home Office Computing.

Lucid 2.0 has vastly improved speed of recalculation of 3-D models due to the minimal 3-D recalc. Huge multi-megabyte models with complicated linking

which would have taken over an hour now takes less than a minute! Version 2.0 can now accept files as big as RAM (up to 8 megabytes) with models as large as allowable disk space. Lucid 2.0 can now read and write 1-2-3 and dBase files directly.



Version 2.0 makes doing "what ifs" a pleasure! Now build your 3-D spreadsheet (the wave of the future) by linking any range of cells to another spreadsheet. What's more, do graphics instantly (includes 3-D bar charts) by just selecting a range. Customize colors for any cells, and use the enhanced text inserting library feature. Further, you can now instantly have up to nine windows of your 3-D levels showing on the screen at once. And that's not all, 38 other new features make spreadsheeting really exciting!

Buy Lucid 3-D for only \$99.95 at all leading retailers. Upgrades to Version 2.0 are only \$55.00. For more information call us at our toll-free number!

**Call Toll Free
1-800-877-8088**

DacEasy

17950 Preston Rd. Suite 800 • Dallas, TX • 75252

30 Day Money Back Guarantee: Dac offers an unconditional guarantee on all products bought directly from Dac Software, (less shipping charges).
Minimum Hardware Requirements: IBM or 100% compatible, 256K memory (512K with Graphics), two disk drives. Mouse optional. **Trademarks:** IBM, MS-DOS, PC-DOS, Lotus 1-2-3, and dBase. Lucid 3-D and DacEasy are trademarks of Dac Software, Inc. 17950 Preston Rd., Suite 800, Dallas, TX 75252
Lucid 3-D is another fine product developed by the innovative people at PCSG.

Perfect running

It's no contest. Funk's 1-2-3® performance software helps improve your 1-2-3 productivity better than any other software you could possibly track down.

That's because each one is in perfect step with 1-2-3. With menus and commands like 1-2-3 itself. And with

Sideways.

The most widely used printing software in the world.

Sideways® has always been the one software to turn to for printing spreadsheets that are too wide for your printer. It turns text on its side as it prints. So no matter how many columns you put in your spreadsheet, you get them all back out in one continuous printout. Without staples, glue or tape.

Create presentation-quality printouts that look just the way you want them to. Highlight ranges with bold, underlined, and expanded type. Choose from nine different type sizes, from minuscule to mammoth. Print through or skip over perforations. Add borders, change page size, adjust margins any way you like.

You can run Sideways right from your 1-2-3 or Symphony menu. Just highlight a range and print.

Plus, Sideways is the right way to print with all your other software, too. Including databases, word processors, project planners, even other spreadsheets. And it prints with all popular dot-matrix printers, as well as the LaserJet Plus/Series II.



"Sideways is such a fundamental improvement in spreadsheet printing that I find it hard to imagine using 1-2-3 without it."

PC MAGAZINE

InWord.

Full-function word processing that runs inside 1-2-3.



If you need to create letters, memos, or reports that include data from your spreadsheet, you need InWord.™

InWord is just a keystroke away from 1-2-3. So you don't have to jump through hoops to put spreadsheet data into a document.

Create live links to data in your spreadsheet. When you change the spreadsheet, the changes appear in the document automatically.

And InWord's powerful formatting features rival the best stand-alone word processors. InWord fully supports the capabilities of your printer, whether it's a 9-pin dot-matrix or an HP LaserJet. You can mix pitch and typefaces freely, and even print in proportional type with full micro-spaced justification for the ultimate in print quality.

"Of all the 1-2-3 word processing add-ins, InWord is the cleanest, fastest, easiest to use." PC MAGAZINE



With InWord, automatic mailmerge is as easy as selecting a range from your 1-2-3 spreadsheet database.

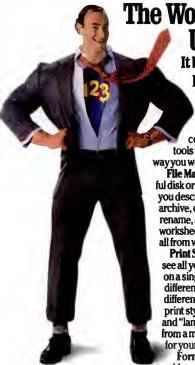


InWord gives you instant spreadsheet integration, plus powerful formatting and typestyle controls.

partners for 1-2-3.

powerful functions and features that take up right where 1-2-3 leaves off.

So don't wait. Dash out to your favorite software store and ask for them by name. Or order directly from Funk Software.



The Worksheet Utilities.

It brings out the power user in anyone.

The Worksheet Utilities™ is a collection of powerful tools that will change the way you work with 1-2-3.

File Manager is a powerful disk organizer that lets you describe, catalog, archive, copy, move, erase, rename, and compress worksheets and other files, all from within 1-2-3.

Print Settings lets you see all your print settings on a single screen, create different print settings for different jobs, and select print styles like "17 pitch" and "landscape mode" from a menu customized for your printer.

Formula Editor provides a powerful environment for entering, editing, and debugging formulas, with point/shoot menus for @ functions, prompting for arguments, and an on-line @ function reference manual.

Search and Replace lets you hunt through your spreadsheet for labels, values, @ functions, and cell references -- and optionally replace them.

AutoSave creates periodic back-ups of work-in-progress, to guard against power failures and editing mistakes.

"Indispensable...a stunning set of utilities...the Formula Editor is simply beyond belief." PC WEEK

Noteworthy.

The software that remembers. So you don't have to.

Noteworthy™ is the professional cell-annotation and documentation software that lets you tell the story behind the numbers, formulas and macros in your spreadsheet.

Want to remember why you put what you put in a cell? Just press the hot-key and up pops a blank note. Then type away using Noteworthy's powerful built-in editor. Make as many notes as you need, each one up to 8000 characters long. Copy text from a note to a spreadsheet. From a spreadsheet to a note. Or from one note to another.

It even reminds you where you put your notes. As you move through your spreadsheet, an indicator lights up whenever you land on a cell containing a note.

"The simplest, most effective, and the most customizable way to attach notes to spreadsheets."

PC MAGAZINE



With Noteworthy, neither you nor others who use your spreadsheets need ever forget the true meaning of a cell.



**FUNK
SOFTWARE**

Sideways \$69.95

Works with all versions of 1-2-3 or Symphony

The Worksheet Utilities \$99.95

Requires 1-2-3 Release 2

InWord \$99.95

Requires 1-2-3 Release 2

Noteworthy \$79.95

Requires 1-2-3 Release 2 or Symphony

To order call:

1-800-822-3865 ext. 115

Funk Software, 222 Third Street, Cambridge, MA 02142

CIRCLE 323 ON READER SERVICE CARD

Sideways is a registered trademark and The Worksheet Utilities, InWord and Noteworthy are trademarks of Funk Software, Inc.
© 1988 Funk Software, Inc.

PROFESSIONAL OPINIONS.

"Clarion Professional Developer 2.0 makes...dBASE and R:base look tired, crotchety and limited in scope?"

—P.C. WEEK

"...when it comes down to the bottom line, Clarion gets our vote...we'd pick Clarion to do it all!"

—INFOWORLD

"...automates the process of creating complex custom applications, ...leaving you little to do but sit around and bask in the praise your programming garners?"

—P.C. MAGAZINE

"...it does just about anything an applications developer could wish for."

—P.C. WEEK

"Serious applications development is a disease. Clarion is the cure?"

—INFOWORLD

"...we give Professional Developer our highest recommendation. It sets a new standard for application developers?"

—P.C. WEEK



In order to form your own opinion about the world's most powerful relational database and programming language, we suggest you invest in your very own edition of Clarion's Professional Developer. Return coupon today or call and ask for the Clarion dealer nearest you.



800-354-5444 or 305-785-4555

CLARION SOFTWARE™

150 East Sample Road, Pompano Beach, FL 33064

For a Free Copy Of Our Tutorial Diskette And Introductory Material Simply Return This Coupon



Name

Company

Address

City State Zip

Phone ()

Mail This Coupon To:

Clarion Software
150 East Sample Road
Pompano Beach, FL 33064

The Clarion Professional Developer is a total programming environment that runs on any IBM PC, PS/2, or true compatible with 384K of memory and a hard disk. The retail price is just \$695. Clarion Professional Developer and Clarion Software are trademarks of Clarion Software. Copyright 1988 Clarion Software. dBASE is a registered trademark of Ashton-Tate. R:base is a trademark of Micromin.

CIRCLE 134 ON READER SERVICE CARD

■ JOHN C. DVORAK

DVORAK'S HALL OF INFAMY



Sixty products have been inducted into Dvorak's Hall of Infamy. To find out how to make your product flop next year, take a look at the Seven Surefire Ways to Fail.

In 20 years, very few of the computer companies that we know and love will still be with us. Many will have zigged when they should have zagged. Many will be bought out by Microsoft or Lotus (and soon thereafter disappear from the face of the earth), and many will go out of business for reasons unknown. Success in high technology is a phenomenon few can understand and fewer can predict.

One way to examine the phenomenon is to look at the big losers and see what they had in common. So I decided to open Dvorak's Hall of Infamy. I've awarded prizes in three categories. Congratulations to the winners.

■ **The Order of the Tin Fireplug** To make it into the top tier of flops, a product had to be overhyped: declared a super-product that would change the world. Those honored in this category are IBM's *TopView*, *The Last One*, *Lightning* from Borland, *Jazz*, Gavilan Portable, IBM PC Convertible, PCjr, Apple Lisa, Convergent Workslate, Mindset computer, TI 99/4A, HP Touchscreen PC, Fortune computer, Intel 80186/80188 chips, Intel 432 chip, Zilog Z-8000 chip, National Semiconductor 32032 chip, *WordStar 2000*, *Ovation*, DEC Rainbow, *Vision*, Tandy 2000, Tandy 600, *DR Logo*, UCSD Pascal, *Valdocs*.

■ **The Order of the White Elephant** Next comes the second tier—products that were ill-timed and flawed, but somewhat interesting. They got publicity, but no sales. Worthy of the White Elephant are: Dot Computer, Cullinet's *Goldengate* spreadsheet, *Boeing CALC*, *Context*

MBA, *Javelin*, CP/M-86, *R-base Clout*, *Jack3*, Apple III, Intel 8085 chip, IBM Portable, IBM 9000, IBM 370/PC, *Savvy PC*, The Xerox PC, the MAD Computer, TI Professional, *Microsoft Access*, Albert Computer, *EasyWriter*, *WordStar* for the PCjr, Commodore PC.

■ **The Order of the Dodo Bird** The bottom tier includes the weird and memorable oddball flops, products in a category by themselves. These include *It* from Martin-Marietta, Dysan/Tabor 3 1/4-inch disk, Amdek 3-inch disk, Apple Twiggy 5 1/4-inch disk, Hercules InColor card, IBM's PC Cluster network, JRT Pascal, NEC V-20, Zilog's Z-800 chip, CP/M 68K, DRI Personal BASIC, IBM RT PC.

I hope I haven't left out any of your favorites. Next year, of course, we'll add to this Hall of Infamy. Meanwhile, we have to look at this list (and it's a good one!) to see if we can find some common threads that determined the fate of these products.



SEVEN SUREFIRE WAYS TO FAIL: 1. Release an inferior product into a marketplace where a superior product is already well established.

2. Ignore research and user preferences and build whatever you think people want.

3. Use drugs and base your decisions on drug-induced logic.

4. Design a product that you can't actually build.

5. Design a product, spend all your money promoting it, and then ship it years later.

6. Produce a product that neither you nor your marketing people can explain to anyone.

7. Give an otherwise decent product a really dumb name.

There's actually an eighth rule:

8. Don't let anyone know about or see the product, especially the press.

Unfortunately, the products in this latter category are the unknown flops—they make up the fourth tier. I'm sure they know who they are and have special secret award ceremonies.

I'd like to personally congratulate these charter members on their making it into the Hall of Infamy.

Now what I have to do is find a good location around Canton, Ohio, or some other little town looking to have a world-famous tourist trap, and we can start a new American institution.

In the meantime, I wish all the newcomers into this business lot of good luck. And remember: if you don't succeed, you've always got Dvorak's Hall of Infamy to fall back on.

The smart buy for PC Power Protection is now . . .

The Smart UPS For LAN's

. . . Reliable Protection From Data Loss



MINUTEMAN
UNINTERRUPTIBLE POWER SUPPLIES

TOTAL POWER PROTECTION:

- BLACKOUTS
- BROWNOUTS
- OVERLOADS
- OVERVOLTAGE
- SURGES/SPIKES
- EMI/RFI

"For All Sensitive Electronic Equipment"



- A unique software package that interfaces your LAN's and Minuteman UPS system for an automatic and orderly network shutdown due to power failures . . . before data loss occurs!
- Compatible with SCO XENIX 2.2.3
Compatible with Novell Systems:
ELS 2.12 and above
Advanced Netware 2.10 and above
SFT Netware 2.10 and above
- Selectable power loss warning times and shutdown times
- Instantaneous user notification
- Also Interfaces to Wide Area Networks
- Auto Shutdown of UPS for unattended operation
- The only software available that supports ELS Level II
- No Novell monitoring hardware required

Power Output	120 Volt Models	230 Volt Models
250 WATT	\$ 379.00	\$ 429.00
300 WATT	\$ 549.00	N/A
500 WATT	\$ 699.00	\$ 799.00
600 WATT	\$ 899.00	\$1049.00
900 WATT	\$1249.00	N/A
1200 WATT	\$1499.00	\$1749.00
1600 WATT	\$1999.00	\$2299.00

Suggested Retail

- One millisecond transfer time *
 - Synchronized sinewave *
 - Full one year warranty
 - Order-Ship same day
- * 250 watt and 500 watt units offer 4 msec transfer time, PWM waveform



PARA SYSTEMS, INC.
1455 LeMay Drive
Carrollton, TX 75007
Telephone: (214) 446-7363

1-800-238-7272

See us at COMDEX-Chicago, Booth #3033

FAX: (214) 446-9011

TELEX: 140275 OMEGA

■ JOHN C. DVORAK

INSIDE TRACK

RISC not, want not

The industry watchers all say that **Digital Equipment Corp.**'s announcement of its new workstation, which is based on the MIPS RISC chip, may signal the **next direction** for the desktop computer. Whether we like it or not, the RISC chip is now where it's at. At least in discussions among hardware designers. This amuses me. Since when does DEC set trends? It hasn't set one since it invented the minicomputer decades ago. But the chatter continues.

If you get the opportunity to see the RISC-based **Personal Iris** machine from Silicon Graphics, then you'll see why the architecture is so appealing. It's small. It's fast. Essentially the RISC chips begin life at about 10 mips, and the sky is supposedly the limit.

If RISC mania, like the sky, is about to fall on our heads, it will happen when Intel formally announces its RISC chip, **code-named the N-10**. Intel is still the most influential designer of microprocessors in the world. If it endorses the trend, then the trend will become official. Meanwhile, Motorola is already promoting its 88000 family of RISC chips, and then there's the SPARC from Sun Microsystems. IBM will say that its RISC-based PC led the way. What does it all mean to you and me? It means we'd better learn Unix, because the lazy vendors of RISC chips will port every conceivable flavor of Unix onto these machines. (Product idea: a Unix shell that looks like MS-DOS!)

The Carnegie-Mellon **MACH** operating systems joined with **Display PostScript** seems to have the most appeal, bugs or no bugs. It's the combo used by Steve Jobs's NeXT machine and expected to appear on the newest incarnation of the IBM RT PC. (I'm told to expect a 600-dpi laser to appear with the RT.)

So I went out and asked about RISC. What are its **three big advantages** and **three big disadvantages**? Three advantages: 1) fast, 2) inherently reliable, 3) easy to design a system around. Three disadvantages: 1) requires speedy memory, 2) I/O-bound by design, 3) moves too many problems from hardware to software, where they are harder to solve.

This brings me to another question: When will software catch up with hardware? The Intel 486 is expected to ship shortly. As usual, the company is going to price the chip high and tell everyone that it's some grand superchip that will be used only in advanced workstations. As usual, every cloner in the country will implement it in a glorified desktop and show off its speed with DOS and WordStar. Already we're hearing that the 586 may be expected to appear in a year and a half. Where's the software for all these chips languishing? We're still running 8088 software on all of them. Does this bother anyone? My suggestion to Intel or anyone who has an 8088 license: Manufacture a modified 8088 chip designed as a RISC chip to run at 100 MHz. That would floor them!

While Almost on the Subject of IBM Dept.: Did anyone see the late-night TV sales of the IBM PC Convertible machines for \$499 on one of those home shopping shows? Is IBM ready to roll something new? Finally? At this writing, all the rumors indicate that the latest attempt by IBM to penetrate the portables business will be yet another machine that misses the point. Word has it that the newest machine, which gossip mongers call the portable Model 70, will have a plasma display and a battery that lasts about an hour maximum. Apparently some researchers determined that typical battery use should be calculated by tak-

ing all the Toshiba's and averaging the battery life. "Let's see, the Toshiba T3100 has a battery life of nil, since it has no battery. Same goes for the T5100. We get 3 hours on a Toshiba T1000. I guess the average user needs an hour!"

Meanwhile, another rumor has surfaced claiming that IBM is replacing the PC Convertible with a **full-color LCD portable** that will blow everything away.

At about the same time I heard that **lulu of a rumor**, I discovered that, down in Atlanta, IBM had a big auction where it sold many of the Boca Raton office machines and a lot of **prototype computers**. Quote from a fellow who got a few of these machines: "Gee, they didn't know how to erase the hard disk. Using the *Mace Utilities* recovery programs I recovered most of the data." Interesting **AutoCAD** files, company memos, and other miscellaneous goodies were found. Gee, you'd think they'd know better.

The Lotus Three-Point-Oh Saga Dept.: I received an interesting memo on my section of the PC MagNet Editorial Forum. Supposedly Lotus is working on another version of 1-2-3 to be called 2.5 or 2.6 or something new altogether. It's designed to continue the compatibility and direction of the original product, since 3.0 seems to be headed who knows where. This project is so secret that the team is camped in Hartford, Connecticut. I think the theory is that if you force someone to live in Hartford, they'll speed up the project just so they can move out quicker. (Just kidding!) Actually, I've always wanted to use that joke about Microsoft, which is located in Redmond, Washington, near Seattle. But people up there all claim to love the place. Scientists are studying the phenomenon and figure the tap water is drugged. All I know is that columnist Steve Manes has moved to Seattle and now he smiles all the time (no kidding!) and keeps saying, "It's better than New York!" So is Hartford, Steve. [E]

DacEasy™ ... Our Business More Software & Hardware

DacEasy Accounting™

\$99.95

More businesses worldwide choose award-winning DacEasy more than any other accounting package for solutions that are quick, simple and accurate, yet detailed and power-packed! The mark of DacEasy's excellence comes with being the only accounting software to win all magazine readers' choice awards in the past three years (such as *PC World's* World Class Award and *InfoWorld's* Readers' Choice Product of the Year). With DacEasy Accounting 3.0, fast installation means answering five quick questions and your business can be operating in 10 minutes. A new user interface provides transaction-oriented pull-down menus for fast, accurate processing. Choose predefined Chart of Accounts tailored for your service or inventory based business, or modify. Best-selling DacEasy Accounting means complete accounting - seven modules (General Ledger,



Breakthru 286 by DacEasy™

8MHz \$395
12MHz \$595

New to DacEasy's product line is the Breakthru 286 speedup board. Undeniably, Breakthru 286 is the most advanced, fastest, turbo board for your business dollar. Breakthru 286 boards provide the most cost-effective way to convert your PC so that it's faster than an AT without the expense. Breakthru is available in two clock speeds, 8MHz and also 12MHz that's 50% faster than regular Breakthru and up to 1000% faster than a regular PC. Installation of a half slot card (only five inches in length) means you don't even have to give up a full slot. And unlike competing products, Breakthru works in most clones and Compaq portables. Easy diagrams show how you simply place the card in an open slot, remove the original processor and connect a single cable. It's 1-2-3 installation, and there's no software required! With its advanced technology, Breakthru 286 replaces the CPU of the PC or XT with an 80286 microprocessor. Once installed, it's running faster than an AT. Plug in an optional 80287 math

"The Breakthru 286 performed flawlessly with every application we handed it, including copy-protected programs and nine memory-resident utilities at once."
Stephen Manes,
PC Magazine



DacEasy Payroll™

The world's best-selling payroll/personnel management system. Version 3.0, simply designed so that virtually anyone in the company can master its features in hours. Take time and worry out of paying employees with Payroll's ability to print continuous checks, W-2s/1099s and automatic calculations. Whether your business is large or small, DacEasy Payroll outperforms systems costing thousands more.



DacEasy Light™

More than a simple checkwriter! Designed for the home and/or sole proprietorship, comes with two pre-defined Chart of Accounts. Even if you have no accounting experience, you'll be able to reconcile bank statements, generate financials, produce invoices and statements. Light does the work behind the scenes! Fast becoming the people's choice for home/office in IBM and Macintosh environments.



Lucid 3-D™

All new, by DacEasy, version 2.0, the most incredible spreadsheet value. Simple to use (even for beginners), yet remarkable for its three dimensional capacity and beautiful graphics. Transport accounting data into Lucid for budgets and proposals without ever rekeying. Winner of the coveted *PC Magazine's* Technical Excellence Award (1987) and *Home Office Computing Editors' Pick* (1988).

is to Offer You Solutions. for Your Growing Business!



The World's Best-Selling Accounting

Accounts Payable, Accounts Receivable, Inventory, Purchase Order, Billing and Forecasting) in one perfectly integrated package that's so easy-to-use!

Delivering tremendous speed and unequalled performance, DacEasy offers context sensitive help with expanded windows for better clarification and a new 460-page manual with primer. Fast, accurate information for multi-departmental or point-of-sale purposes, plus more than 700 reports for making better management decisions.

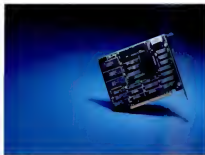


"The nation's top-selling accounting program. A flexible, inexpensive package with many unexpected features."

DacEasy Accounting continues to have

a lineup of extras you'd expect to find in only expensive, high end programs."

PC Magazine



Accelerate Your Work with Confidence

coprocessor chip for numeric intensive applications as well. A 16K cache provides zero-wait-access to the most recently used code and data. Software compatibility is virtually universal so that all system RAM, hardware, and peripheral cards can be used without modification. Breakthru operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). And Breakthru board's speed switching capability even lets you decrease speed on the fly for timing sensitive applications. Experience the difference with the best executed, most reliable speedup boards in the industry. And with your board, you'll receive absolutely **FREE**, Lightning, a disk-caching program, (named PC Magazine's 1986 Editor's Best) that normally retails at \$69.95. *"The Breakthru 286 achieved the best performance results of the caching boards tested."* Ted Mirecki, **PC Tech Journal** (Rated #1)



\$49.95

Rolodex Live!™

DacEasy's newest way to save time and keep track of people, places and events at the touch of a key. For any home or office, there's never been an easier, more organized way to create, update and print Rolodex cards, custom labels and envelopes. Instant lookup (pops up over any other software) for tip of the tongue information. Bring your Rolodex cards to life!



\$69.95

DacEasy Word™

Here's power and simplicity in one word processing value. Version 3.0 is so simple that anyone can quickly learn to master a full feature word processor. And for more performance, Word provides windowing (up to four at one time), mail merge, word search, expanded dictionary with word option, and punctuation corrector to name a few.

See your local Dealer or call:

1-800-877-8088

(In Canada, call 519-747-9633)

Also ask for your **FREE** People's Choice catalog on the entire line of DacEasy software and hardware.

DacEasy insico
17950 Preston Road • Suite 800 • Dallas, TX 75252

See us at Spring Comdex in Chicago at booth #8222.

*Unconditional 30 Day Money Back Guarantee on all products bought directly from Dac Software (less shipping charges) Minimum Hardware Requirements: IBM PC or 100% compatibles. Other specifications may vary by product. ©1989, MS-DOS, Lotus, Intel, Microsoft, Rolodex and Macintosh are registered trademarks of their respective corporations. *DacEasy, Lucid 3-D, Breakthru 286 and Rolodex Live! are trademarks of Dac Software, Inc. Copyright © 1989, by Dac Software, Inc. All rights reserved. Ask for operator #107



Sometimes, even on the best planned LAN, everybody doesn't seem to be pulling in the same direction. Getting together can be a problem.

Unless you have R2LAN™— from the makers of CROSSTALK:

Sometimes a small change in your equipment can make all the difference.

With R2LAN, when you co-write a document, you can actually co-write it. You and your writing partner both see the same thing on your own screen, and either of you can make a change from your own keyboard—and both of you will see it immediately.

That's the kind of screen-to-screen, keyboard-to-keyboard collaboration you get with R2LAN.

In fact, R2LAN lets you treat any PC on the network as if it were your own, updating data files, troubleshooting, or just sharing data.

LAN's were meant to bring people together. There are greater benefits than just sharing peripherals and transferring files. At least there are if you're using R2LAN from CROSSTALK. A small change in your equipment *can* make all the difference.

CIRCLE 278 ON READER SERVICE CARD

R2LAN™

CROSSTALK COMMUNICATIONS
1000 Holcomb Woods Parkway
Roswell, Georgia 30076-2575
404/998-3998

A Division of Digital Communications Associates, Inc.
An NYSE listed company. For a copy of the annual
report or further information call 404/998-3998.

CROSSTALK is a registered trademark of Digital
Communications Associates, Inc. R2LAN is a trade-
mark of Digital Communications Associates, Inc.

dca

■ JIM SEYMOUR

THE 1/2nd ANNIVERSARY



IBM has done a pretty good job of nurturing its PS/2s. But Big Blue hasn't done so well with its software brainchild. Looks like OS/2 is headed for the Terrible 1/2s.

We're coming up on an important 1/2nd anniversary. On April 1/2, 1987, IBM introduced both the new PS/2 line of personal computers and the OS/2 operating system. In a series of roll-out events—from a hall full of cheering dealers in Florida to a basement full of skeptical reporters at IBM's corporate offices in New York City—IBM told us that tomorrow was here and that these 1/2 product lines would replace what we were using at the time.

But 1/2 years later, DOS is livelier than ever. And the original PC bus and especially the PC AT bus (now almost universally called the "classic bus," with a tip of the hat to the marketing wizards at Coca-Cola who saved Old Coke when New Coke fizzled in the marketplace) are robust, and dominant in the market.

The progress of these product lines, and their likely futures, are 1/2 very different stories.

PS TO U/2 Though PS/2s still can't do anything useful that can't be done with an AT-bus PC clone, PS/2 sales are no longer sputtering. And the machines are no longer klutzy, underpowered losers.

We've documented the foibles of the PS/2s and IBM's handling of them since their introduction. We've questioned the numbers IBM reported on its shipments of PS/2s: even when we allowed for European sales and gray-marketing, it was clear those numbers were high, or else a lot of computers were being stacked up in someone's warehouses. And we've pointed out often that the original quartet of PS/2s

were not very smart buys, compared with the alternatives from Compaq, Dell, ALR, and a flock of other vendors.

Over the past 6 months, that's changed. PS/2s are selling well. Buyers are happy. While many of us weren't looking, IBM has fixed most of what was wrong with the line.

There was the original Model 50, hobbled by a ridiculously slow hard disk. That got fixed in the newer 50Z. There was the 16-MHz Model 80, which didn't deliver the kind of performance we expect from 386 PCs—especially those delivered in mini-style "tower" configurations. That got fixed with the 20-MHz Model 80, and once again with the Model 70 A21, which is a compact desktop screamer.

There was the forlorn Model 30, with the old bus and the wrong chip. That got fixed, at some loss of face, with the new Model 30 286, which returns an AT-bus machine to IBM's product line and deliv-

ers performance on a par with most AT clones—at a roughly similar price.

There was the Model 60—which we might as well forget.

And there was the Model 25, which hasn't done nearly as well as IBM expected in the home and especially in the education market, but has found a home in some other applications. I've found Model 25s on receptionists' desks, for example, as dedicated phone-list machines; in telephone-support departments of PC software firms (such as WordPerfect Corp.), where their compact size leaves room in the cubicle for something other than the computer; in PC training classrooms; and in other jobs where a cheap IBM-label PC with a very small footprint is a smart idea.

On balance, the PS/2s have worked out for IBM. Sure, it was stupid to boost the competition and lose a year and a half of desktop 286 sales by dropping the AT-bus line. Sure, screw-ups in bringing out the PS/2s probably cost Bill Lowe his job as the head of IBM's Entry Systems Division. And sure, buying a PS/2 is still an act of faith, betting on the outcome, hoping that someday Micro Channel architecture will be able to do some fancy tricks.

But there's no longer any reason *not* to buy PS/2s.

And OS/2?

A LITTLE 1/2 MUCH OS/2 is still mired in high costs and little value for the PC user—a fatal pairing. It has to be counted as a failure for both IBM and its development partner, Microsoft.

This may be the year that changes. But



■ JIM SEYMOUR

I'm skeptical: I don't think Microsoft or IBM will fix what's wrong with OS/2 anytime soon.

OS/2 is still an oddity, a very expensive way to access more than 640K RAM di-

rectly and get more than one program running at once. For most of us, cheaper paths—from *Windows/386* to *VM/386* to *DESQview*—will do just fine till OS/2 delivers real value.

103 Fonts
and Symbol Sets!



BUY ONE. GET 24 FREE.

Buy all of these cartridges separately and you would spend over \$5500. The "25 Cartridges in One!" has fonts for your LaserJet Series II printer.

A single cartridge with 103 fonts and symbol sets, 13 typefaces, and 11 sizes of type for about the cost of one cartridge.

Buy the only cartridge you need for every application. Full support included for the new high-performance word processing packages. Excellent for use with WordPerfect® 4.2 and 5.0, WordStar®, Word® MultiMate®, Samna®, XyWrite®, Lotus 1-2-3®, Excel®, PageMaker® and Windows®.

PACIFIC
DATA PRODUCTS

6404 Nancy Ridge Drive • San Diego, CA 92121
(619) 552-0880 • Fax: (619) 552-0889
Telex: 9102507881 PAC DATA

CIRCLE 126 ON READER SERVICE CARD

What will that take, exactly?

First, it means moving OS/2 onto the 386 chip as fast as possible. IBM's insistence that Microsoft first develop OS/2 for the aging 286 chip was the biggest boner in the whole /2 saga. Maybe it was a matter of keeping the faith with buyers of the PC AT—which, when introduced in August of 1984, was touted by IBM as a machine that would be able to address the 80286 chip's full 16MB of address space directly. Just as soon as we get that new operating system. Which turned out, 4 years later, to be OS/2.

Second, OS/2 has got to become a multiprocessor operating system. There's little mystery why we're not seeing multi-master/multiprocessor architecture add-in cards coming to market for the PS/2s' MCA bus: they'd need a multiprocessor operating system strong enough to know

■ OS/2 is still mired in high costs and little value for the PC user—a fatal pairing. It's a failure for both IBM and Microsoft.

how to hand off jobs to several processors.

Until Microsoft writes and IBM distributes that 386-based, multiprocessor operating system—OS/X—a lot of us are going to continue to have /2nd thoughts about jumping to OS/2.

Put simply, OS/2 is still mired in reasons *not* to buy. If you thought my assessment of the progress of the PS/2s ("at least there's no longer any reason not to buy them") was an indictment of the kind of technological leadership IBM has provided, consider how much worse the situation is with OS/2.

Today, /2 years after the first shot, IBM's little revolution is at best a stalemate. If the PS/2s have finally begun to set a meaningful new standard, OS/2 remains a nonstandard, an object lesson in the perils of poor-aim points and feeble implementation for new-technology products. ☐



And then...
Maxell created
the RD Series.



Maxell Corporation of America, 22-08 Route 208, Fair Lawn, NJ 07410

Never before has this level of Reliability and Durability been available in floppy disks. Introducing the new RD Series from Maxell. Twice the durability of the disks you're now using. Twice the resistance to dust and dirt. And the RD Series is ten times more reliable than conventional floppy disks. The Gold Standard has always meant maximum safety for your data. Now it means even more.



maxell
THE GOLD STANDARD





"At 25MHz this is the fastest
beast I've ever
had the pleasure to meet."

John C. Dvorak
Columnist, PC Magazine

IBM PS/2 Model 80 (20 MHz)	_____	3.52 MIPS
Compaq DeskPro 386/20	_____	4.59 MIPS
Everex Step 386/20	_____	4.91 MIPS

Power Meter MIPS Version 1.2. The Database Group.

"What am I doing
here?"

I guess I have a
reputation for
saying what's on my
mind. So when
the people at Everex
asked me to be in
their ad, I said it was
okay as long as they
let me have the floor.

The reason I like
their Step 386/20 is
simple. It's fast.
It is definitely the
fastest machine
that I've seen so far.

When they sent
the machine over, I
put it through
every benchmark
test I could find.
I finally gave up.
It was the highest
on all of them.


Give me the choice
and I'll use the fast-
est thing I can
get my hands on.
This happens to be it.

What can I say?
I like the beast.

For your nearest
authorized Everex
Computer Systems
Reseller call
1-800-356-4283.
Everex,
48431 Milmont Dr.,
Fremont, CA 94538.

CIRCLE 216 ON READER SERVICE CARD





U.S. MAIL

When We Challenged Our Competitors' Customers To Try PC Tools, This Was Their Answer.

A couple of months ago we gave users of Norton,[™] Fastback,[™] Sidekick,[®] X-TREE,[™] Mace,[™] and Disk Optimizer[®] a chance to upgrade to the number one selling utility package: PC Tools[™] Deluxe.

A few days after the ads ran we started getting bags of mail, week in and week out, from customers anxious to get something better than what they already owned.

But why would they opt for PC Tools Deluxe as opposed to staying with what they already had? Simple. Because it's a far better product. It includes the best of what the others offer, and a lot more.

You see, PC Tools Deluxe is the only product to give you a DOS Shell, data recovery utilities, a hard disk backup program, and a desktop manager all in one box. Which means you won't have to learn the ins and outs of a whole bunch of products.

Just one—PC Tools Deluxe.

The only one with pull-down menus, full mouse support, and a windowed environment that lets you run up to 15 of our desktop applications at once.

The only one with an operating environment so consistent throughout that once you've learned one application you'll be proficient in them all.

And the one that has received PC Magazine's Editor's Choice Award not just once, but twice.

So if you're looking to buy the best, buy PC Tools Deluxe first. You won't be disappointed.

Central Point Software[™]
A VIDEO TECHNOLOGY COMPANY (503) 690-8090

CIRCLE 120 ON READER SERVICE CARD

PC Tools is a trademark of Central Point Software, Inc. All other product names are trademarks of their manufacturers.

■ WILLIAM F. ZACHMANN

THE OSF'S CXI: A THORN IN IBM'S SIDE



The news that the OSF has adopted a Unix interface based on IBM's Presentation Manager is more likely to bring victory cries from Hewlett-Packard than from Big Blue.

One might easily assume that it is a triumph for IBM that the Open Software Foundation has adopted what amounts to the "look and feel" of the OS/2 Presentation Manager. After all, IBM is one of the OSF's founders, and IBM's own flavor of Unix, AIX (based on System V, Release 2), is itself the basis for the OSF's "other" Unix.

Curiously, however, IBM played no part in the OSF's adoption of the OS/2 PM-like Common X Interface (CXI) and has shown little enthusiasm for the move. IBM didn't even propose CXI when the OSF requested a graphical user interface (GUI) technology. Rather, it was Microsoft and IBM competitor Hewlett-Packard that submitted the CXI proposal.

What's more, IBM is playing no part in the interface's implementation. Instead, engineers from Hewlett-Packard and IBM-archival Digital Equipment Corp. are implementing CXI under the direction of the OSF staff, not only for the OSF version of Unix (the OSF/1 Operating System) but for the AT&T flavor and Unix International's System V, Release 4, as well.

Isn't it strange that what seems, at least on first glance, to be an endorsement of the OS/2 Presentation Manager interface should be supported more vigorously by IBM's competitors than by IBM? After all, doesn't PM also provide the foundation for the Common User Interface for IBM's Systems Application Architecture (SAA)? Has IBM managed to get two of its chief competitors to help spread its own version of computing and preferred-user interface? Is Big Blue coyly manipulating

events from backstage? Or are things other than they seem?

In fact, the adoption of the OS/2 Presentation Manager interface (modified slightly by the 3-D look of Hewlett-Packard's OpenView adaptation) for Unix by the OSF represents perhaps the most dire threat to IBM's industry dominance to date. Understanding why will help unravel one of the most complex and convoluted battles the computer industry has seen.

AMBIVALENCE ON STANDARDS An important point to consider is IBM's inherently ambiguous relationship to Unix. Even before that, it's useful to remind ourselves that IBM's stand on Unix is merely an instance of IBM's more fundamental ambivalence regarding standards. Were it not for requirements from customers, it is very doubtful that IBM would have anything at all to do with standardization.

It is proprietary architectures—not

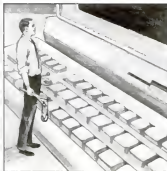
standards—that have at all levels (system, operating system, and network) long given IBM the control over its customer base and the high profitability that only a semi-monopoly market can provide. The lock-in between proprietary IBM architectures and users' software investment is essential to IBM's industry dominance.

Standards of any sort threaten that dominance in direct proportion to their impact on the industry. Contrary to popular opinion, IBM is not and cannot be a low-cost producer of information-system products. Though IBM's manufacturing costs may be as low or lower than those of smaller competitors, its total costs are higher.

IBM, like the United States and Soviet governments, is a huge bureaucracy and is as likely as they to remain so, despite determined efforts to the contrary from the top. Smaller competitors with a narrower range of products and lower overhead often can, and indeed do, provide quality products profitably at much lower prices.

In addition, IBM's appetite for over \$50,000,000,000 in revenues per year cannot possibly be satisfied by a wide-open, competitive market for standardized information systems. IBM requires the semimonopoly advantage that traditional proprietary architectures provide.

MARKET DEMANDS However, IBM is also very much a marketing and market-driven company. Demand for standard solutions is a message that IBM has been getting loud and clear from its market for some time. IBM began developing Unix products only when Unix became a re-



■ WILLIAM F. ZACHMANN

quirement to win government contracts.

With Unix, as with standards generally, IBM must sail between the Scylla of losing control in the market that proprietary architectures provide and the Charybdis of not

providing the standards the market demands. The result is that IBM supports standards no more than the minimum deemed necessary to respond (or at least to appear to respond) to market demands.

IBM's dilemma with Unix is how to go far enough in supporting it to be able to sell to customers who demand Unix, yet not so far as to encourage customers who might be sold proprietary IBM alternatives to consider switching to Unix.

IBM has made every effort to keep its proprietary, "mainstream" products—3090-class mainframes, AS/400 midrange systems, and what were meant to be mostly proprietary desktop systems built on the Micro Channel architecture (MCA) and OS/2 Extended Edition (EE)—separate and distinct from its Unix (AIX) offerings. IBM claimed, contrary to obvious fact, that there was no demand in the Unix market for the Presentation Manager interface or for SAA. In this way, IBM tried to maintain the illusion that Unix is merely a niche market and that it will always remain so.

NICHE MARKETS PREFERRED

IBM's organizational separation of the RT and AIX from the mainstream PS/2 (with MCA and OS/2)—coincident with former Entry Systems Division president Bill Lowe's departure for Xerox—was part of the same campaign. While publicized by IBM as a "renewed emphasis on workstations," the division was at least as much an effort to keep IBM's Unix products confined to niche markets.

So it's no accident that it wasn't IBM but Hewlett-Packard and Microsoft that proposed CXI to the OSF. Acceptance of the look and feel of PM by the OSF is, in fact, a dire threat to IBM. It creates an opening by which SAA applications may easily slip away from the protected world of IBM proprietary systems into what will be a highly competitive and increasingly price-sensitive world of powerful, Unix-based systems that will be capable of taking on mainframe-sized applications.

Acceptance of CXI by the OSF effectively nullifies IBM's attempt to keep Unix segregated from mainstream computing. Given that IBM's effort to move back to a more proprietary environment at the low end with MCA and OS/2 EE is already in trouble, acceptance of what was meant to be an IBM-only interface on Unix only makes matters worse. It simply makes it easier for IBM's competitors to take business away from Big Blue. □

Break DOS's 640K Shackles!

"A top slot on anyone's software shopping list...helps TSRs co-reside in any system...
HEADROOM is a grand idea..."

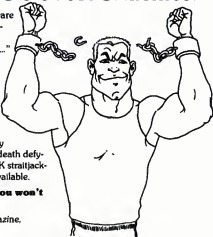
Winn L. Roch, PC Week,
December 19, 1989

"Calling HEADROOM a memory manager is like calling Houdini a handcuff manager."

Helix Software's \$95 memory manipulator performs more death-defying escapes from DOS's 640K straitjacket than any other program available.

...This is one magic act you won't want to miss."

Edward Mendelson, PC Magazine,
February 28, 1989



HEADROOM™

The New Dimension in Memory Management

Control RAM-Resident (TSR) Programs

- Free all memory occupied by RAM resident programs
- Load or remove TSRs on the fly without leaving your application
- Swap TSRs instantly to/from expanded memory, extended memory, or to disk
- Use TSRs' own hot-keys to pop them up
- Eliminate conflicts among TSRs and between applications and TSRs
- Control up to 32 TSRs/groups of TSRs
- Display menu of loaded TSRs
- Activate and deactivate TSRs at any time
- Swap and control ANY TSRs, even key macro programs
- Control TSRs from batch files or through the API-load, unload, reload, remove
- Pop all TSRs up at any time—even in graphic programs

All TSRs remain fully functional, but use none of your 640K memory, and HEADROOM itself uses only 50K.

Control Application Programs

- Load up to 32 applications simultaneously
- Hot-Key quickly (in 4 seconds on an AT) from one program to another
- Set up any hot keys for your programs
- Switch between any applications, even graphics and mouse driven programs.
- Reload programs from their saved memory image
- Switch programs from a batch file or API
- Re-boot any application partition without affecting others
- Display menu of loaded applications

\$95 order now: **1-800-451-0551** in NY
(718) 262-8787 9am to 5pm EST; (\$5 per order shipping, \$20 outside U.S.) VISA/MC/COD or write to us at:

HELIX
SOFTWARE CO., INC.
83-60 Daniels Street • Briarwood, N.Y. 11435 • (718) 262-8787
Patent Pending

How Farsighted Executives Are Using Their PC's For The Fun Of Profit.

By William J. Spink

For years now you've been hearing about the wonderful things personal computers will do for The Executive of the 80's—at least in theory.

But what's the *reality*? Can a PC help you enjoy your work more and save a greater profit, here and now? According to your peers, the answer is "yes."

"With just a few keystrokes," says Al Lynch, Director of Corporate Planning and Research for JCPenney Company, "I can screen companies, find possible acquisitions or 'scope-out' competitors. It's a real competitive edge."

Walt Casey, V.P. of Communications at ConAgra says, "I spend a lot of time each day poking into this and tracking that. It's *much* easier when you can immediately get the facts from a computer, rather than having to make a series of phone calls."

"One of Dow Jones News/Retrieval's services, QuickSearch, is a Godsend," adds Jim Posner, a respected retail consultant. "It gives me detailed corporate reports within minutes—I don't even have to leave the office."

Instant information: the executive advantage.

To lead in today's marketplace, you need information like *that*," Lynch says, snapping his fingers.

He recalls an example of how Dow

Jones News/Retrieval®—the business and financial information service from Dow Jones & Company, Inc.—gave JCPenney Company a real advantage.

"Let's just say that a 'major player' in our industry was being acquired. Within a few hours we knew more about the takeover candidate than the bidder did. Honestly, we knew more than some investment bankers did."

Decision-making with the leading edge.

"Then we started getting the corporate insider trading data," Lynch continues. "It showed us some things that influenced a major deal."



Al Lynch
Director of Planning
and Research,
JCPenney Co.



Walt Casey
Vice President,
ConAgra, Inc.



James Posner
President
Jones Posner
Assoc. Ltd.

"This service really makes a difference in the day-to-day running of your business. It can pay for itself very quickly." Surprisingly easy.

All you need to access the service is a PC and modem. Using the service is

What can you get from your PC?

- Dow Jones News/Retrieval gives you...
- Exclusive online access to the full text of *The Wall Street Journal*
- Current and historical stock quotes
- Business news as it happens
- 10-K and 10-Q data
- Leading investment analysts' reports
- Complete corporate profiles
- Over 40 services including MCI Mail®, the Official Airline Guide™ and more.

"No problem," according to Posner.

"There's no difficulty using the service. I ask for pointed, specific information and get exactly what I need. It's much easier than manual research."

Walt Casey agrees. "Dow Jones News/Retrieval is simple enough for anyone who's at all comfortable with computers to use it effectively from their very first day online."

Making the right decision.

There are hundreds of online information services, many offering business data. How can you pick the best one?

"It was apparent that the most useful system was Dow Jones News/Retrieval," remembers Casey. "It offers so much of the information you're looking for—from general news and stock quotes, to data on our company and industry. It was the best single source."

"I've had other services, but Dow Jones News/Retrieval has the most useful business information in the right form," says Posner. "The time I spend 'playing' on the computer makes more money for me—and for my clients."

Now that's the *fun* of profit! ■

Get 8 FREE hours online to experience the "fun of profit" on your PC.

YES, I'm ready to experience the fun of profiting from my PC. Send me a Dow Jones News/Retrieval® Business Membership Kit, including multiple passwords, 8 free* hours of online time, a year of *Douline*™ Magazine, a comprehensive User's Guide and waiver of my first year's annual \$18 service fee—for only \$49.95.

- ☐ \$49.95 Business Membership Kit
☐ Bill me later
☐ Charge to my AmExp

Acct.# _____ Exp. _____
 If you pay by credit card, future charges will be billed to this account.

Signature (required) _____
☐ Check enclosed

Name _____
 Title _____
 Company _____
 Address _____
 City/State/Zip _____
 Daytime phone _____
 Computer make and model _____
☐ Please send more information.

For faster service, call 1-800-221-7700, Ext. 25D today!

DOW JONES NEWS/RETRIEVAL®

From Dow Jones & Company, Inc.

The information that powers today's business.™

DJN/R Membership Kit, P.O. Box 186, Drexel Hill, PA 19026-9973 25D

*This offer expires April 30, 1990. Free time is per account. New domestic and Canadian subscribers only. Free time must be used within 30 days after receipt of passwords. Some additional fees may apply on certain services. © 1989 Dow Jones & Company, Inc. All rights reserved. MCI Mail is a registered service mark of MCI Communications Corp. The Official Airline Guide is a trademark of Official Airline Guides, Inc.

telemart

Doing Business Since 1980 A Division of CW Marketing, Inc.

LOGITECH MICE

LogiMouse	\$60
LogiMouse w/Paint Show	69
Logi Buss Mouse w/Paint Show	70
Logi Buss w/Publisher	95
LogiMouse w/Logi Cadd	99
Logi Buss Mouse w/Logi Cadd	99
LogiMouse w/Publisher	95
LogiTech Hi-Res Mouse	69

SOFTWARE PUBLISHING

First Publisher	\$69
First Graphics	75
First Choice	82
Professional Write	102
Professional File	152
Professional Plan	51
Harvard Graphics	255
Harvard Project Mgr. III	349

SOFTWARE

DATA BASE MANAGEMENT

Amfi	\$88
Ask Sam	159
Clipper	405
Data Base Base	26
Data Perfect	279
dBase IV	448
dBase IV LAN	599
DB-XL Diamond	107
Foxbase 386	285
Foxbase Plus	187
Genifer	188
Nutshell	123
Nutshell Plus	185
Paradox 3.0	403
PFS: Professional File 2.0	152
D & A	199
D & A Write	116
Quicksilver Diamond	319
R-Base For DOS	425
Revelation Adv.	465
VP Expert	115
VP Info	56

MONEY MANAGEMENT

Dollars & Sense	
w/Forecast	\$91
Tobias	
Managing Your Money 5.0	114

CAD & ENGINEERING

Design CAD	\$143
Generic CAD w/Dot Plot	72
Generic CAD Level 3 w/Dot Plot	119
Generic CAD 3D Self Modeling	167
Math CAD	199

UTILITIES

1 DIR Plus	\$45
Allways	80
Brooklyn Bridge	69
Carousol 2.0	43
Copy II PC	18
Copywrite	59
DB Fast	72
Corefast	28
Cruise Control	55
Desk Link	90
Designview	69
Direct Access	47
Disk Optimizer 4.0	37
Disk Technician	54
Disk Technician Adv.	101
Disk Technician Plus	67
DS Back-Up Plus	46
Fastback Plus	81
Formworks w/Fill & File	32
Fastrax	71
Grasp	44
H-Test Format	163
Keyworks Adv.	73
Laplink +	72
Mace Gold	77
Mace Utilities	59
Microsoft Windows 286	115
Microsoft Windows 386	43
Norton Commander	35
Norton Editor	47
Norton Utilities 4.5	47
Drp Plus	49
Drp Plus Adv	79
PC Fullback	37
PC Tools Deluxe 5.0	36
Print Q	79
Right Writer	46

Sidekick Plus	125
Sideways	37
Smart Key	42
Spinnwrite	45
SDZ Plus	53
Superkey	58
Tornado	48
Tops Flashcard	142
Tops IBM	99
Turbo Assembler Debugger	95
Unlock Game Master	23
Unlock Masterkey	55
Who What When Where	105
XTree	34
XTree Professional	61
XTree Pro Network	61

ACCESSORIES

Copy II	
Option Board Deluxe	\$99
MS Mach 20 Memory Plus	309
MS Mach 20 Baseboard	308
Masterpiece	79
Masterpiece Plus	92
Summasketch 12 x 12 +	335
Summasketch 12 x 18	579

DISKETTES

Maxell 3 1/2 DS/DD (100)	\$145
3 1/2 High Density (100)	349
5 1/4 DS/DD (100)	90
5 1/4 High Density (100)	115
Sony 3 1/2 S/S (100)	125
3 1/2 DS/DD (100)	145
3 1/2 High Density (100)	355
5 1/4 DS/DD (100)	65
5 1/4 High Density (100)	125

WORD PROCESSORS

Borland Sprint	\$119
DAC Word 3	37
Easy Extra	53
Grandview	175
Multimate Advantage II	275
PFS: Professional Write	102
Total Word	239
VolksWriter 4	89
VolksWriter Deluxe Plus	57
Y Write III +	209
Webster	
New World Writer II	53
Prof. Spell Checker	32
New World Thesaurus	32
Word (Microsoft)	179
Word Perfect 5.0	219
Word Perfect Executive	117
Word Perfect Library	58
Wordstar Pro Pack 5.0	233
Wordstar 2000 Plus 3.0	239
Wordstar 2000 + Legal	315

TRAINING

Chessmaster 2100	\$30
Chuck Yeager	
Adv. Flight Simulator	27
Mavis Beacon	
Teaches Typing	28
MS Learning DOS	29
MS Flight Simulator	31
PC Logo (New Ver.)	53
Typing Tutor IV	27

DOS

MS DOS 3.3	\$85
MS DOS 4.01	89
PC DOS 3.3	95
PC DOS 4.0	115



MEMBER
MMC
MICROCOMPUTER
MARKETING COUNCIL
of the
Direct Marketing Association, Inc.

- No APO, FPO, or international orders please
- Call Before Submitting P.O.'s. Ask for National Accounts.
- Personal and Company Checks Will Delay Shipping 3 Weeks.
- Prices, Terms & Availability Subject to Change Without Notice.
- Add 5% for C.O.D. Orders.
- No returns on misordered or opened products.
- We Do Not Guarantee Machine Compatibility.

- No Charge for VISA and Mastercard
- We Do Not Charge Your Card Until Your Order is Shipped
- You Pay The Ground Shipping 1-10# \$6.00, 11-20# \$10.00 (Except Alaska & Hawaii). We Pay the Air Difference
- Free Air Applies ONLY to Orders Over \$100
- All products (including DOA's) carry manufacturer's warranties only. We do not honor guarantees, rebates, trial period privileges or promotional programs offered by manufacturer

1-800-426-6659

ORDER LINE



SPECIALS

Microsoft PC Excel

\$215

Microsoft Word 4.0

\$179

Microsoft PC Works

\$88

Microsoft Windows 286

\$59

SOFTWARE

COMMUNICATIONS

Carbon Copy Plus	\$106
CompuServe	
Subscription Kit	19
Crosstalk XVI	87
Crosstalk Mark IV	109
Direct Access	47
Magic Mirror	53
Mirror III	49
PC Anywhere III	62
Procom +	45
Remote 2	87
Smartcom II	79
Smartcom III	136

NETWORKING

ANW/286 2.12	\$1745
ELS II	899
SFT NW 286 2.12	2975
Novell	Call

MICE

PC II Mouse w/Paint	
(Buss or Serial)	\$81
PC II Mouse w/Autosketch	
(Buss or Serial)	97
Omni Mouse	49
Microsoft	
Buss Mouse 1.0	95
Serial Mouse 1.0	95
Buss Mouse w/CADD	109
Serial Mouse w/CADD	109
Buss Mouse w/Windows	125
Serial Mouse w/Windows	125

INTEGRATED SOFTWARE

Ability Plus	\$137
Enable OA	369
Framework III	409
MS Works	88
PFS: 1st Choice	82
Smart Software System	385
Symphony	409

LANGUAGES

MS Basic Compiler	\$176
C Compiler (Microsoft)	266
Cobol Compiler (Microsoft)	531
MS Fortran Compiler 4.0	266
Lattice C Compiler	195
Lucid 3D	65
Macro	
Assembler (Microsoft)	89
Pascal	
Compiler (Microsoft)	179
Plan Perfect	186
Quick Basic 4.0	59
Quick C	59
Ryan McFarlan Fortran	375
Ryan McFarlan Cobol	579
Turbo Basic	62
Turbo C	88
Turbo C Pro	147
Turbo Pascal 5.0	88
Turbo Pascal Dev. Library	228
Turbo Pascal Pro	152
Turbo Prolog	88

DESKTOP PUBLISHING

Adobe Illustrator/	
Windows	\$329
Newsmaster II	38
Pagemaker 3.0	499
PFS: First Publisher	69
Publishers Paintbrush	132
Publishers Type Foundry	227
Ventura Publishing	445
Ventura Publishing Pro	445

PROJECT MANAGEMENT

Harvard	
Project Manager III	\$349
Microsoft Project 4.0	295
Superproject Expert	409
Timeline 3.0	349

SPREADSHEET

Cambridge Analyst	\$80
HAL	85
Lotus 1-2-3 Ver. 2.01	285
Lotus Agenda	239
Lotus Manuscript	299
MS Excel	215
MS Excel/Mach 20 Bundle	620
MS Multiplan 4.0	116
PFS Professional Plan	51
Quattro	146
Supercalc 5	309
Twin Advanced	62
Twin Classic	32
VP Planner	47
VP Planner Plus	112

GRAPHICS

Deluxe Paint	\$80
Designer	399
Draw +	229
EGA Paint	61
Freelance Plus	299
Gem Draw +	159
Harvard Graphics 2.1	255
Microsoft Chart 3.0	234
News Room Professional	40
PC Paintbrush +	69
Printmaster Plus	28
PrintShop	32
Publishers Paintbrush	132
Timeline 3.0	349
Turbo Graphix Tool Box	62
VP Graphix	56
Draw Plus	229

ACCOUNTING

ACCPAC Easy	\$53
ACCPAC BPI	225
Bedford Accounting	135
DAC Easy Accounting	53
DAC Easy Bonus Pack	107
DAC Easy Payroll	53
One Write Plus 2.0	117
One Write	
A/R, A/P, Payroll	117 ea.
Peachtree II	142
Quicken	26
Time Slips	69
TimeSlips III	47
TimeSlips Acct Link	43

* To Place an Order: 1-800-426-6659.

* To Follow Up On An Order: (602) 944-1037.

* Order Line Hours: Mon - Fri 7:00 am - 6:00 pm
Saturday 9:00 am - 1:00 pm.

telemart

Mailing Address:

8804 N. 23rd Avenue / Phoenix, Arizona 85021

FREE

AIR EXPRESS SHIPPING
You Pay the Ground Shipping
We Pay The Air Difference

ORDER LINE **1-800-426-6659**

telemart

Doing Business Since 1980 A Division of CW Marketing, Inc.

**The Acknowledged Leader
in the Computer Mail Order Industry.**

Call About the Availability of Other Products Not Listed.

MIT SYSTEMS



Pictured Above PC/XT Turbo •

MIT SYSTEMS

PC/XT TURBO

10MHz, 640K Memory, 150 Watt PWR Supply,
Keytronic Style Keyboard, 1-360K Drive,
AT Style Case, Monographs Card w/parallel
Printer Port, Clock Card w/Serial Port,
Mono Monitor w/Swivel Tilt Base

\$709

System w/2 Drives \$787
System w/1-20 MG Drive 994
System w/1-30 MG Drive 1021

MIT SYSTEMS

PC/386

16 MHz, 1024K Memory,
200 Watt Power Supply,
Enhanced Keyboard,
1.2 MG Floppy Drive

\$1899

System w/1.2 Floppy & 40 MG Drive \$2285

Pictured Below PC/386 •



Pictured Above PC/286 Turbo •

MIT SYSTEMS

PC/286 TURBO

12 MHz, 1024K Memory,
200 Watt PWR Supply,
1.2 MG Floppy Drive,
Enhanced AT-Style Keyboard,
EGA Monitor, AT Multi I/O Card, EGA Card

\$1713

System w/1.2 Floppy & 40 MG Drive \$2097

COMPUTERS

Turbo	
w/640K 1 Drive	\$560
PC/XT w/360K & 2 Drives	630
PC/XT w/360K & 1 Drive & 20 MG	835
PC/XT w/360K & 1 Drive & 30 MG	859
PC 286	
12 MHz Zero Wait State w/1024K	
1.2 Floppy Drive	1190
12 MHz Zero Wait State w/1024K	
1.2 Floppy Drive 40 MG	1575

MONITORS

MIT Amber Monitor w/SW Tilt	\$95
MIT Color Monitor	229
MIT EGA Monitor	345
MIT VGA Monitor	355

DISPLAY CARDS

MIT Auto Switch EGA Card	\$139
MIT Color Card	45
MIT VGA Card	229

ACCESSORIES

MIT A/B Switch Box (Par/Par)	\$31
MIT Enhanced Keyboard	65

I/O CARDS

MIT I/O Serial Clock	\$39
MIT I/O Serial-Parallel	38
MIT Monographs Card	55
MIT AT Multi I/O	65
MIT XT Multi I/O	65

MODEMS

MIT 1200B Modem (INT) with Software	\$59
MIT 1200B Modem (EXT) with Software	75
MIT 2400B Modem (INT) with Software	119
MIT 2400B Modem (EXT) with Software	139

1-800-426-6659

HARDWARE

PRINTERS

Alps		NEC P2200	349
Allegro	\$345	P5200	505
Other Models	Call	P5300	675
AST		Silent Writer	Call
Turbo Laser	2865	Okidata 182 +	225
Brother		320	309
HL-BE Laser	Call	321	439
M-1000	139	390	439
Other Models	Call	391	609
Citizen Printers		393	999
1200	145	Laserline 6	1325
1800	165	New Lasers	Call
Other Models	Call	Panasonic	
Diconix		10921	319
150	305	1124	319
Epson Printers		1180	185
FX850	395	1191	249
FX1050	459	Laser 4450	1610
LD500	289	Other Models	Call
LD850	555	Ster Microics	
LX800	175	NX 1000 Rainbow	225
Other Models	Call	NX 1000	169
Hewlett-Packard		NX 2400	Call
Desk Jet	725	Other Models	Call
Laser Jet II D	3099	Toshiba	
Laser Jet Series II	1785	Express Writer 311	385
Paint Jet	1085	Page Laser	2535
Scan Jet	1525	Other Models	Call

ACCESSORIES

Computer Tool Kit	\$18
Disk Bank w/Lock	12
Joystick	19
Keyboard Drawer	25
Curtis	
Anti Static Mat	29
Ruby Plus	59
Ruby Surge Suppressor	49
TARGUS	
LAPKAC Portable Computer Case	49

TERMINALS

Wyse 30	\$295
50	369
85	439

KEYBOARDS

Keytronics	
KB5151	\$119
KB5153	150
KB101 Plus	85

NETWORKING

Altec Passive Hub	\$29
AQUILA 8 Port Active Hub	289
AQUILA Arcnet Card	125
SMC Md1 120 Arcnet Card	125
Novell	Call

SCANNERS

Complete 400	\$139
Half Page	175

MODEMS

Anchor 1200 B w/software	\$59
1200 EXT	89
2400 B w/software	119
2400 EXT	135
Hayes 1200	279
1200B	249
2400B	389
Prometheus	
1200B w/software	70
2400B w/software	125
2400G	149
US Robotics	
Password 1200	139
Courier 2400	255
HST 9600	589
SPORTSTER 2400 B w/software	125

COMPUTERS

Amstrad	
PPC 640-1	\$775
PPC 640-2	779
AST	
Model 80	1389
Model 140X	2285
Other Models	Call
NEC	
Multispeed EL II	1479
Multispeed HD	2299
Toshiba	
T-1000	789
T-1200F	1370
1200F8	1569
T-1600	3375
T-3100E	2899
T-3200	3665
T-5100	4795
T-5200	6415
Zenith	
Supersport 20	2429
Supersport 286	3335
Amdek	
210A	\$80
410	135
NEC	
Multisync II	589
Multisync Plus	899
Multisync XL	2199
Monographic System	1289
Other Models	Call
Pricentone	
Ultrasync	499
Ultrasync 16	539
Max 12	129
Max 15	239
Samsung	
Sony	
1302A	589
Multiscan (1303)	545
Mitsubishi	
Diamond Scan 12"	499
Diamond Scan 16"	1145
Zenith	
1490	599
Plus	
20 MG	\$509
40 MG	645
Passport 20	429

MONITORS

Complete 4800	\$225
Complete 9600	389
FAX MACHINES	
Brother 150	\$919
Sharp	Call

DISK DRIVES

Bernoulli Box	
10 Meg	\$889
20 Meg	1250
40 Meg	1580
Beta Ext. 20 MG	1009
Beta Int. 20 MG	765
Seagate	
20 MG w/Seagate Controller	275
251-40 MG	435
30 MG w/HT	295
40 MG w/Controller	439
Other Models	Call
Teac	
1.2 MEG AT	85
Floppy XT	70
Toshiba	
3.5 Dr 720K	79
3.5 Dr 1.44M	99

BOARDS

AST	
Hot Shot	\$310
Six Pack Plus w/384K	269
Xtormer	589
AT Rampage	379
VGA	245
VGA Plus	329
ATI	
EGA Wonder	225
Heracles	
Color Card	145
Graphics Card Plus	175
Incolor	205
Intel	
Above Board Plus	390
Inboard 386 PC	575
Inboard 386 AT	1175
80287-6	129
80287-8	195
80387-16	359
8087-2	119
Orchid	
Designer 800	235
Pro Designer	295
Pro Designer + 1024 x 768	385
Tiny Turbo	249
Trim Turbo	355
Other Models	Call
Paradise	
Autoswitch 350	185
Autoswitch 480	195
VGA +	259
VGA Professional	475
Video-7	
Fastwrite VGA	345
VGA	285
Vega Deluxe	205
V-RAM	475

FREE

AIR EXPRESS SHIPPING
You Pay the Ground Shipping
We Pay The Air Difference

1-800-426-6659



OUR NEW \$249 HAND SCANNER WILL CHANGE THE WAY YOU SEE THINGS.

MORE SHARPLY. The Complete Hand Scanner/400™ is the easy, affordable way to add extra impact to newsletters, reports and documents.

It gives you a choice of resolution: 200, 300, even a razor-sharp 400 dpi. It scans material up to 2½" wide by 14" long.

And it displays the image on the screen as you scan.

FROM ANOTHER PERSPECTIVE. Our SmartScan™ software scales, rotates, crops, edits and re-sizes images from 10% to 200%.

IN PRINT. The SmartScan software also gives you total control of your layout.

Just scan and position your images anywhere on the page. Then add them to any of the most popular graphics, word processing and publishing programs: WordPerfect®, Ventura

Publisher®, PC Paintbrush +,™ and PageMaker.*

AND BIGGER. For larger images, get The Complete Half-Page Scanner.™ You can scan an entire page in two quick passes, then combine them into one full-size image at a crisp 200 dpi. Just \$299.

Both scanners come with an easy-to-install interface card, SmartScan software, and a 2-year warranty. All you need is an MS-DOS® PC with a hard disk and a graphics card.

To find out more about the very best hand scanners you can buy, call our toll-free number today. **1-800-634-5558.**

The Complete PC

521 Cottonwood Drive, Milpitas, CA 95035 (408) 434-0145 FAX (408) 434-1048.

©1988 The Complete PC. The Complete PC, The Complete Hand Scanner/400, The Complete Half-Page Scanner, and SmartScan are trademarks of The Complete PC, Inc. All other names are trademarks or registered trademarks of their respective companies.

CIRCLE 135 ON READER SERVICE CARD

■ STEPHEN MANES

COMMUNICATIONS BREAKDOWN



Some organizations have 500 386 machines, 1,000 on order, and 15 six-figure consultants to link 'em all together. But those aren't the organizations that call Manes.

It's the phone again. At this hour, all my friends are hard at work, and really important messages arrive via MCI Mail or Federal Express. Chances are it's a PR person with a mission, a stockbroker with time on his hands, or a synthesized voice offering me the rare opportunity to procure a coveted Intergalactic Gold Discount Card for only \$49.97 if I call back in less than 10 minutes with the correct answer to this simple question: What glamorous blonde flips the letters on "Wheel of Fortune"? (A) Eleanor Roosevelt, (B) Helen Keller, or (C) Va—

For some reason I pick up the receiver anyway. The caller is a sincere, friendly, frazzled employee of a professional organization I belong to. She has been told I know a thing or two about computers. Do I have a minute?

This, I know all too well, will be one of those 3,600-second minutes. But what the hey: it promises to be more interesting than a conversation with a customer-service rep about the great new utility software that has just decided to turn my computer into a random-pixel generator.

"One of our East Coast members," my caller informs me, "just got back from a trip out to L.A. He came back raving about this incredible service our West Coast office has now. I think they call it an on-line bulletin board?"

"Besides the fine, clear air, what exactly he was raving about?"

"Well, the way he described it, it sounded really neat. Members can send messages to each other. I think they can even pick them up whenever they want."

"Amazing," I marvel.

"So our member suggested it'd be a great idea if we started one of these things here in New York for the East Coast."

BICYCLE MESSENGERS A paid consultant would delight in running up his billable hours by eliciting more information, lending a sympathetic ear, and setting forth a plethora of possibilities. As an unpaid consultant, I ask one simple question: "Why?"

"You know, so our members could exchange information and stuff."

"Apparently they have not yet been informed about an invention called the telephone."

"Yes, but he said this would let us here at the office communicate with all our members at once."

"I admit I don't read it all that often, but as I recall, we do have a monthly newsletter."



"But that has to go to press weeks before we can get it back from the printer. Then it can take days and days until the post office delivers it. This way, we could get important news out to all the members right away."

I sigh silently.

"Couldn't we?" asks the caller.

I sigh audibly. "Sure. Assuming we ever have news that's really that hot. And assuming all the members would check the bulletin board religiously. And assuming all the members have computers. And modems. Do they?"

"Oh, no. I don't think so."

"Great. How would you feel if you were a member and there was some hot news you desperately needed to know about and you never found out about it because you didn't happen to own a computer or remember to check in with the official bulletin board? Better stick to Alexander Graham Bell and bicycle messengers."

ALL-AROUND NOGOODNIK "Well, what about this idea of the members who do have computers being able to leave messages for one another?"

"Let 'em use the West Coast bulletin board. Besides, that way the members on both coasts could sort of get to know each other. You might create a new breakthrough in bicoastal relations."

"But it's a long-distance call."

"Then install an 800 number for our members."

"Oh, I don't think we could do that. That could get really expensive."

"Wait a minute. You think running



COMPUTERS FROM IOWA SURPASS ALL OTHERS!

We at Gateway 2000 firmly believe that we are the best source for computers in the nation.

We have over 2000 configurations available, all priced incredibly low and all backed by our unsurpassed service.

"We are very happy that our system is at the top of the stack in both price and performance, but it is your courteous service that is untested by the competition."

— Pierce Haviland — Kingston, NY

"Overall, I feel that your product is outstanding and your service has been excellent."

— Eric Sjogren — Stonington, CT



12 Mhz 286 VGA

2 Megs RAM
1.2 Meg 5 1/4" Drive
1.44 Meg 3.5" Drive
40 Meg 28ms SCSI Drive
10 Mbits/Sec DTR
16 Bit VGA Board
14" VGA COLOR Monitor
1 Parallel/2 Serial Ports
101 Key Keyboard
MS DOS 4.01

\$2295.00

16 Mhz \$2395.00

20 Mhz \$2495.00

20 Mhz 386 VGA

1 Meg RAM
1.2 Meg 5 1/4" Drive
1.44 Meg 3.5" Drive
80 Meg 28ms SCSI Drive
10 Mbits/Sec DTR
16 Bit VGA Board
14" VGA COLOR Monitor
1 Parallel/2 Serial Ports
101 Key Keyboard
MS DOS 4.01

\$2995.00

(Upgrade to 4 Megs \$500)

25 Mhz 386 VGA

4 Megs RAM
1.2 Meg 5 1/4" Drive
1.44 Meg 3.5" Drive
150 Mbits/Sec ESDI Drive
10 Mbits/Sec DTR
16 Bit VGA Board
14" VGA COLOR Monitor
1 Parallel/2 Serial Ports
101 Key Keyboard
MS DOS 4.01

\$4495.00

(Call for 33 Mhz Option)



Steve Apiki & Stanford Diehl
Oct. 1988, **EUTE**
Review of 20 386

- "Emerging as truly exceptional..."
- "The Gateway delivers speed without sacrificing features."
- "The system ran without a glitch."
- "We were truly surprised to see a system of this caliber selling for less than \$3000."
- "When evaluating the whole package, The **GATEWAY 386** surpasses all the others!"

CIRCLE 25 ON READER SERVICE CARD



Gateway 2000 • P.O. Box 2000 • Sgt. Bluff, IA. 51054

800-233-8472 / 712-943-2000

All systems have a 30 day Money Back Guarantee and 1 Year Warranty.
Due to the Volatility in the DRAM Market all prices subject to change.



PC *to* PAPER

FAX GROWS UP

■

*Less than a year ago,
a fax board for a PC was a questionable investment. Today
you can find at least several
well-designed systems that transmit text and graphics—
and handle the arcane
details of data communications for you.*



In case you haven't noticed, fax technology is coming of age—and changing the way businesses communicate.

The latest wrinkle in fax transmission is the partnership between fax and PC. Like any good partnership, this is one where both sides bring something important to the relationship. Fax technology offers a worldwide communication standard and a large installed base of fax machines with which to communicate. The PC makes it easy to manage a large phone book and multiple distribution lists. It also lets you schedule calls at inexpensive, nighttime phone rates.

As a PC user, you can look to fax boards for an alternative means of data communications. A fax board gives you a way to transmit text and graphics without having to worry about such matters as baud rates, parity, stop bits, file transfer protocols, and other arcane details. As a fax user, you can look to PC-based fax packages as a way to automate fax distribution. From either point of view, joining PC and fax promises to achieve more than

either technology can offer alone.

Alas, much of the potential remains just that—potential. You can still get burned by making the wrong choice. In *PC Magazine's* last roundup of fax boards (see "Getting the Fax," June 28, 1988), we found that many packages seemed to have been cobbled together. The typical menu system looked as if it had been added as an afterthought, with menu choices that weren't implemented and important features available only from the DOS command line.

This time around, we found some of the same problems. But we also found several well-designed packages—among them Intel's Connection CoProcessor, The Complete PC's Complete Fax/9600, Quadram's JT-Fax 9600, and Brother's IntelliFAX—that are good examples of what a fax package can be. In short, the PC-based fax package is coming into its own.

WHICH FAX IS FAX? Facsimile transmission has been around since the middle of the 19th century. Fax standards as we know them today date back to the 1960s,

when the European-based CCITT (International Consultative Committee on Telephone and Telegraph) first established worldwide standards. Fax machines based on the Group 1 standard took about 6 minutes to send a single page. Group 2 protocols, established in the mid-1970s, cut transmission time in half.

Throughout the 1960s and 1970s, the number of fax machines grew slowly and steadily. However, the explosion didn't begin until the 1980s and the introduction of the Group 3 standard.

Group 3 fax is what most people mean when they talk about fax. Introduced and approved by the CCITT in the early 1980s, the Group 3 standard succeeded in making fax transmission simple, reliable, and *fast*. Group 3 machines use a 9,600-bit-per-second, half-duplex modem to transfer data on standard phone lines, and they include a data compression scheme to speed transfer further still.

Transmission time varies depending on the compressibility of a given page, but it typically ranges from 30 to 60 seconds per page. On poor lines, the fax modem will

drop back to 7,200 bps, then 4,800 bps, and then 2,400 bps. This slows down the transfer but still lets the fax get through. Some Group 3 machines can also detect a Group 2 or Group 1 machine and fall back to the earlier protocols. (Few fax boards include this feature. However, this is not an important factor for most users, since there are few Group 1 and 2 fax machines in use.)

Just as important as speed, Group 3 offered improved readability. A machine in either Group 1 or 2 had a resolution of about 100 dots per inch. Group 3 fax resolution is either 100 by 200 dpi (standard resolution) or 200 by 200 dpi (fine resolution).

With the introduction of Group 3 machines, the fax market took off. According to Alan Pyne of CAP International, a market research firm that specializes in fax issues, sales of fax machines in the U.S. have more than doubled in each of the last 4 years—with about 90,000 sold in 1985, 200,000 in 1986, 450,000 in 1987, and as many as 1 million in 1988. During the same time, the installed base of fax machines in the U.S. has gone from 200,000 to 1.9 million, and the installed base worldwide has gone from 1.2 million to 7.7 million. Sales are expected to double once again in 1989.

This explosion in the fax market has been accompanied by falling prices. As recently as early 1987, a stripped-down fax machine sold for \$2,500 or more. In 1989 the least expensive machines sell for well under \$1,000.

The numbers speak for themselves. Clearly the fax market has reached critical mass. The value of having fax capability has increased dramatically, simply because there are more people to talk to, while the price of that capability has gone down. As a practical matter, owners of even small businesses are beginning to find it embarrassing if they have to answer no to the question "Can you fax it to me?"

Not so incidentally, there is now a Group 4 fax standard. Group 4 fax machines can send a page in 5 to 10 seconds, with resolutions of up to 400 dots per inch. However, this group of machines requires an all-digital telephone network, which is not likely to be widely available until well into the next century, and they sport prices

of \$8,000 and up—mostly up.

For now and some time to come, Group 4 machines will be of interest primarily to a few large corporations that are willing to make the investment in dedicated, digital lines for in-house communications. For the rest of the world, fax communications will mean Group 3 fax.

ENTER THE PC When PC-based fax packages were introduced at \$1,000 to \$1,500, stripped-down fax machines were selling for \$2,500 to \$3,500. Many argued at the time that fax boards could serve as inexpensive substitutes for fax machines. With fax packages now in the \$400 to \$1,000 range and fax machines selling for

■
*Receiving a fax on a
PC adds its own
complications: reboot
your system while a
transmission is in
progress, and you can
lose the fax.*
■

under \$1,000, that argument is hard to maintain.

In reality, fax packages never were an inexpensive substitute for a fax machine. Start with \$1,000 for a fax package, add another \$1,000 or so for a scanner, and you're well into fax machine territory. What's more, since fax files are graphics files, they can quickly eat up a great deal of disk space. Realistically, you'll need 2 or 3MB of storage even for casual use; so you may need to spend a few hundred dollars for a larger hard disk. By the time you're done, you could easily buy a full-featured fax machine.

Aside from price, there is the issue of convenience. One of the driving forces behind the fax revolution is ease of use. Most fax machines are almost as easy to use as a telephone: put the paper in the fax scanner,

enter the phone number, and hit the start button. Anyone can learn how to use a fax machine in about 5 minutes' time.

Compare that with faxing from your PC. First, you have to load the fax program. Then, if you start with hard copy, many packages force you to scan the image into a fax file as a separate step. Even those packages that let you scan and send in a single step will ask you to make more choices than with a fax machine.

With a typical menu system, to send a fax you might have to choose Send, designate where to send from (disk or scanner), tell the system what kind of disk file if sending from disk (for example, ASCII, PC Paintbrush, Dr. Halo, or fax format), whether to send immediately or at some specified time and date, and whether to take a phone number (or distribution list) from an on-line phone book or let you enter it from the keyboard. With all these choices to make, even the most intuitive menu structure will take some time to learn.

Receiving a fax on a PC adds its own complications. With a PC-based package that uses foreground mode, you have to load the program, wait for the fax, then typically give it a command to print the fax. For those programs that use background mode, you have to give up some precious memory and hope that the fax program doesn't conflict with any of your other programs. You may also run into such problems as losing a fax simply because you chose to reboot your system and didn't realize that there was a fax transmission in progress. Compare that to receiving on a fax machine, where all you have to do is pick up the pages as they fall out of the fax printer.

WHEN FAX MAKES SENSE Clearly, a PC-based fax package at any price is not a practical substitute for a fax machine. Yet there are two situations where fax boards make good sense. One is when your needs are so sporadic that you can probably manage without any faxing capability at all. The other, ironically, is when your needs outstrip the abilities of a fax machine.

If your faxing need is strictly occasional and is limited to receiving faxes and to sending text and graphics that you create on your computer, then a fax pack-

age—without a scanner—is all you need. Virtually all fax packages will convert and send ASCII files, and most will convert one or more popular graphics formats: typically *PC Paintbrush* and *Dr. Halo*. Some packages—such as *The Complete PC's Complete Fax/9600*—will even capture output meant for a printer. This procedure lets you tell your favorite program to print a file, then have the fax package convert the print output into a fax. One of the benefits of sending a graphics file by fax rather than by modem is that you can send graphics to anyone and not have to worry whether the person receiving it has the right graphics program with which to print the image.

If your needs are heavy duty, almost any fax package will let you create and manage large phone books and multiple distribution lists. Some go even further. For example, Ricoh's *ImageCard* is designed to be a server for a fax network. Special software lets you call from PCs that don't have fax boards and use the server to send faxes elsewhere. Other packages—notably *Gammalink's GammaFax*—include a rich batch language to let you program your own applications.

PC-based fax packages have some inherent advantages over fax machines. Any fax sent directly from disk will look sharper than one that has been scanned, simply because scanning degrades an image. Also, any fax printed on the paper of a computer printer has an advantage over faxes printed on the thermal paper of a reasonably priced fax machine.

One common misconception is that faxes printed on a 300-dpi laser printer will automatically look better than faxes printed on a fax machine. This is not usually true. The quality of the laser output depends almost entirely on the conversion algorithm in the fax package. In any case, as our timing tests show, receiving a fax and then printing it at even 150 dpi on a laser printer takes far longer than printing on a fax machine—or a dot matrix printer. If you get a fax package, you may want to resurrect your old dot matrix printer.

SIMILARITIES AND DIFFERENCES

The 15 packages reviewed here represent a wide range of design choices, yet these fax packages share a number of important fea-

FAX MODEM AS DATA COMMUNICATIONS MODEM

One of the more intriguing facts about 9,600-bit-per-second fax boards is that every board is built around a 9,600-bps modem. Some fax packages, like Intel PCEO's *Connection CoProcessor*, take advantage of this by offering a 9,600-bps file-transfer feature.

Unfortunately, you can't use the high-speed file-transfer feature unless you have the same model board on both sides of the connection. What keeps different boards from sending files to each other is that each manufacturer uses its own file-transfer protocols.

Given that the 9,600-bps modem market suffers from this same lack of standardization, fax board manufacturers have a golden opportunity. Namely, fax board modems can become the basis for a 9,600-bps standard for data communications. All that's needed is agreement on the standard.

That standard may well be coming—and sooner rather than later.

In August 1988, CAP International, a market research company that specializes in fax issues, called a meeting of fax vendors with the hope of hammering out a standard for binary file transfer. As a result of that meeting, a group was formed to help establish a standard. Last

November this group became an official subgroup of the Electronic Industries Association (EIA) TR29 Facsimile Systems and Equipment committee with the function of defining the data processing protocol for fax boards.

As of this writing, the subgroup on binary file transfer had been charged with presenting a proposed standard to the TR29 group in February 1989. According to Phillip Bogosian, the chairman of the subgroup, the proposal emerging from the February meeting should be developed well enough that some manufacturers may choose to implement it even before it becomes an official EIA position. If so, we will soon be seeing fax boards that include the proposed binary-file-transfer specification.

According to Bogosian, current boards should be able to use the new standard once it is developed. For boards without processors, the protocol should be fully implemented in the software. Boards with processors will probably need firmware changes. But in any case, the new standard should not require additional hardware—though some manufacturers may choose to add more memory, for example, to gain additional buffering. —M. David Stone

tures, particularly on the hardware side. All 15 are built around the same Rockwell chip set, ensuring an underlying compatibility with fax modem protocols. Several—including Intel's *Connection CoProcessor*, *The Complete PC's Complete Fax/9600*, and Ricoh's *ImageCard*—feature on-board microprocessors to allow true background operation.

Most, including the *Connection CoProcessor* and the *Complete Fax/9600*, offer a Hayes-compatible 1,200- or 2,400-bps modem either as standard equipment or as an option. And only one board, Omnium Corp.'s *Omnium PC Fax System*, has a maximum transmission rate of 4,800 bps; all the rest have a maximum transmis-

sion speed of 9,600 bps.

As is often the case, software varies more widely than hardware. For example, some packages force you to convert files to fax format in a separate step; others convert and send in a single step, creating the fax file automatically. Still others—notably Quadram's *JT-Fax 9600* and Intel's *Connection CoProcessor*—minimize the need for disk space by converting to fax format during transmission without needing to create a new file.

Encouragingly, installation was not as much of a problem with this crop of packages as in the past. In many cases, reviewers had products installed and working in an hour or less, thanks to generally im-

■ FAX SYSTEMS

proved installation instructions. Alas, there are still some packages that can take a full day or more to get up and running.

INTRODUCING CAS A last item worth noting is the introduction of CAS as a feature on Intel's Connection CoProcessor. CAS, the DCA/Intel Communicating Applications Specification, is a proposed standard for communications hardware and software. Given CAS hardware such as the Connection CoProcessor, any application can use CAS to add background communications and fax capabilities.

CAS allows for wide variation among programs. Typically, the communications menu for each application will be designed to look like the base program, so that a *Lotus 1-2-3* add-in will have the look and feel of 1-2-3, while a *WordPerfect* menu will have the look and feel of *WordPerfect*. Unfortunately, the variation can extend to features and menu logic (as opposed to look and feel) as well, so that if CAS catches on, you may have to learn a different menu logic with each program, and you may have limited features available in some programs.

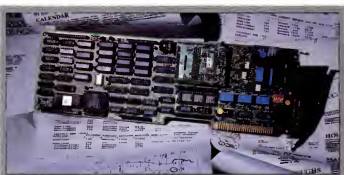
As of this writing, the impact of CAS is not clear. The idea of a standard background communications capability is attractive, but many fax packages without CAS already handle fax transmission from within any application. And even as CAS applications are being developed, so are other, competing approaches. For example, *WordPerfect* has just announced a new driver to let users send and receive faxes from within *WordPerfect 5.0* using *JT-Fax*.

By all indications, we are looking at the opening moves in a drive to integrate fax capabilities into standard PC applications. The results promise to be interesting.

AMERICAN DATA TECHNOLOGY INC.

SMARTFAXplus

American Data Technology's SMARTFAXplus is the fax board for the person who needs everything. Besides having the standard fax capabilities, the software that comes with the SMARTFAXplus offers you several convenient reference re-



Besides such advanced fax features as calling lists, transaction logs, and a printer capture mode, the software that accompanies the 9,600-bps SMARTFAXplus, a \$799 full-length interface card from American Data Technology, has reference resources for time zones and telephone area codes.

sources, such as those for time zones and telephone area codes. It also boasts a full array of advanced features such as calling lists, transaction logs, and printer capture mode. The basic unit costs \$799, but if you want to buy add-on modules to equip the SMARTFAXplus with a data encryption board, a scanner interface card, a modem, and more, you can spend in the neighborhood of \$2,000—overkill for most applications.

The basic unit is a 9,600 bits-per-second fax board on a full-length interface card. Its accompanying software employs a combination of simple-to-use horizontal moving-bar menus for major functions and pull-down vertical menus for options.

RELIABLE BUT NOT PERFECT The SMARTFAXplus runs in the foreground, in the background, or as a TSR that takes up about 60K of memory, an improvement over some other programs that need a minimum of 140K just to sit in the background and stay awake. Our background operation error testing proved the SMARTFAXplus to be reliable but not great: you won't get into trouble by losing faxes it thought it sent, since it can recover from problems and reschedule calls. On the other hand, if a receiving computer is busy looking at an empty drive, the SMARTFAXplus can't sneak through as can some of the more robust units.

The SMARTFAXplus has calling lists,

call scheduling, a printer capture mode in which it holds anything formatted for an Epson FX-80 printer, and screen capture for subsequent transmission. Unlike some other units, the SMARTFAXplus does not capture screens for immediate transmission, though it can send captured screen files later. Quite handy is a conversion utility for changing files between text, graphics, and fax formats before or after transmission. You can also convert files to fax format at the same time as transmission to save disk space.



FACT FILE

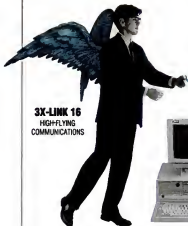
SMARTFAXplus
American Data Technology Inc.
44 W. Bellevue Dr., #6
Pasadena, CA 91105
(818) 578-1339
List Price: \$799

Requires: 640K RAM (hard disk recommended); IBM PC, XT, AT, PS/2 Model 25 or 30, or compatible; CGA, EGA, or Hercules graphics adapter; DOS 2.1 or later.

In Short: A moderately expensive 9,600-bps internal fax board system that can quickly become a very expensive system with the addition of optional modules. The SMARTFAXplus software uses horizontal sliding-bar and pull-down menus and is easy to operate. Includes a world map with time zones and an area code database.

CIRCLE 106 ON READER SERVICE CARD

3X-LINK16 the LAN ALTERNATIVE!



3X-LINK 16
HIGH-FLYING
COMMUNICATIONS

**Connect up to 16 computers and printers
without network nightmares.**

Power file transfer

Imagine transferring files at 500,000 bps, without a network! Just plug a 3X-LINK16 cable into the **parallel** port on up to 16 computers, up to 400 feet cable length (your printer stays connected). Then run our software.

In just seconds, you'll be transferring files in full **background** mode! No need to interrupt your current program. And no need to interrupt your business as you install (and maintain) an expensive network. You can even transfer files automatically, using our auto-script feature.

Instant printer sharing

And our optional 3X-Spool16 intelligent printer spooling software lets you share connected printers (up to 16), automatically managing paper sizes all without waiting. And without buying limited, expensive printer sharing boxes.

Invisible E-Mail

What's more, our built-in E-Mail feature lets you send messages in background mode, no extra E-Mail software required.

The choice is yours :

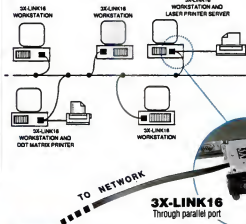
3X-LINK16 comes complete with 3 1/2" and 5 1/4" software diskettes, parallel connectors, and a 12 foot cable... all you need to connect two PCs for only \$199. Additional stations can be added for \$139 each. 3X spool16, our printer sharing software option, can be added for only \$149.

And you get our 30-day money back guarantee to insure your satisfaction.

The only thing easier than choosing 3X-LINK16® is using it.

For more information or to order 3X-LINK16®, contact your local dealer or call:

**800-327-9712, or FAX: (201) 592-0908,
or in N.J.: (201) 592-6874**



**3X USA Corp. One Executive Drive Fort Lee N.J. 07024
Phone: (800) 327-9712**

Give us an inch...



...and we'll give you complete power control. MasterPiece® Plus

Master Piece Plus gives you everything you need to organize and protect your personal computer system. It offers five outlets, a master switch, surge suppression, noise filtering, static protection, a low voltage indicator, modem protection, and a swivel—all in one elegant unit just an inch and a half high.

Master Piece Plus blends in perfectly with any system. Just slide it between your monitor and system unit, and plug your equipment into its five outlets for complete control. Its master switch lets you power up everything at once, and its individual switches let you control your peripherals separately. Touch the master switch to shut down and you'll never accidentally leave anything running overnight.

Master Piece Plus also offers the most complete protection available. Its heavy duty surge suppression



circuitry exceeds strict UL and IEEE specifications. Its noise filtering circuitry protects against EMI and RFI. Its two protected phone jacks defend your modem (and PC) against surges and spikes on the phone line. Its nameplate dissipates harmful static whenever you touch it. And its unique low voltage indicator alerts you when your power level drops below the safety of 104 Volts, to warn you of dangerous low power conditions.

Master Piece Plus even has a hidden swivel that lets you adjust the angle of your monitor. (Easily detachable if your monitor already has a built-in swivel.)

Master Piece Plus—the only complete power center—only \$159.95. Call 800-535-4242 or 212-475-5200 for a Kensington dealer near you. Or write to Kensington, 251 Park Avenue South, New York, NY 10010.



CIRCLE 533 ON READER SERVICE CARD

■ FAX SYSTEMS

SMARTFAXplus reads and writes PC-Paintbrush, Dr. Halo, and TIFF graphics files. Once you receive a file, SMARTFAXplus has only limited editing features, including cutting and pasting, file merging, and the ability to add text to a file. It also has normal- and high-resolution modes, normal and compressed fonts, and gray scaling support, which cannot be turned off.

According to the vendor, the SMARTFAXplus works with all Group 3 fax machines; we had no trouble sending or receiving faxes with any of the fax machines used in testing. In addition, the system

■

*While the
SMARTFAXplus is a
fancy unit that's
easy to like, it
didn't fare too well
on the PC Labs aspect
ratio tests.*

■

works with Princeton LS-300A, Hewlett-Packard ScanJet, Canon IX-12, and Pentax scanners, and with IBM and Epson dot matrix and HP LaserJet printers and their compatibles as well as the Canon laser printer.

In our tests the SMARTFAXplus was moderately fast. As is typical, it took about twice as long to receive and print a file with the SMARTFAXplus as it does to get hard copy from a fax machine.

The SMARTFAXplus didn't fare too well on the PC Labs aspect ratio tests. While you can easily adjust page size both vertically and horizontally to correct for skewed aspect ratios, when we used the default settings the resulting test grid came out about twice as long as the original, and text came through looking as if it had been squashed. These problems can be taken care of by adjusting the page size, but the fact remains that the SMARTFAXplus

was noticeably off on this particular test.

Despite this, it's easy to like the SMARTFAXplus; it's a fancy unit with a lot of features and an attractive interface. You just have to make sure that you can resist the temptation to load up on all but the most essential extras.—Bruce Brown

AT&T

AT&T Fax Connection

AT&T's fax board has the sleek, luxurious look that goes with fine materials and careful workmanship. But the software that comes with the full-length \$995 Fax Connection board, while straightforward and reliable, is a lot less sleek-looking. It works entirely from the DOS command line, using almost no menus except during installation.

The Fax Connection's software drives a scanner, maintains a useful and readable log, lets you view incoming faxes reasonably quickly, and lets you send multiple files to one or more destinations. The software runs in foreground mode only, forcing you to convert your computer temporarily into a fax machine whenever you send or receive. Many users will need little more.

However, a couple of paragraphs buried in an addendum to the manual suggest that you may want to buy AT&T's separate PagePower software package to in-

crease the powers of the Fax Connection board. PagePower is a \$295 software behemoth that you can buy along with the board for \$200 if you know enough to order them together. PC Labs tested the board with the software that comes with it, and we also took a long look at PagePower.

The native software installs in a few seconds. You can choose to work with an Epson, HP, or AT&T printer, and you can choose the size of the buffer used for incoming faxes (the larger the better). You also select the resolution you want for sending and receiving and pick a hotkey for a screen capture program. Anyone familiar with DOS command line syntax can start running the program after spending a few more seconds with the manual.

SENDING AND RECEIVING When you run the sending program, you use the DOS command line to specify the names of the files you want to send, the resolution, the phone number (or file with a list of numbers), or an optional switch that lets you start sending manually during a voice call. The software automatically sends ASCII files without preconversion, but can't convert or send any graphics formats other than those created by a scanner. However, you can merge the first page of text with a graphic logo or letterhead file created with the scanner.



The full-length 9,600-bps \$995 Fax Connection board from AT&T comes with software that drives a scanner, maintains a useful and readable log, lets you view incoming faxes reasonably quickly, and lets you send multiple files to one or more destinations. The software runs in foreground mode only, forcing you to convert your computer temporarily into a fax machine whenever you send or receive.

■ FAX SYSTEMS



Fax Systems: Summary of Features

(Products listed in ascending price order)

	Microlink Fax LC96 \$499	FaxMail 96 \$599	Omelam PC Fax System \$599	Pamirs FA16 \$645	GammaFax \$695	MicroFax \$695
FAX FEATURES						
Standard Group 3 speeds (bps)	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	4,800, 2,400, 1,200	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400	9,600, 7,200, 4,800, 2,400
High-resolution mode	○	●	●	●	●	●
Supports gray scale or dithering	○	●	●	●	○	●
Transmits compressed fonts	○	●	○	●	●	●
Can include document header	●	●	○	●	○	●
Maximum number of pages transmitted	999	360	Unlimited	Unlimited	Unlimited	Unlimited
Does polling	○	●	○	●	●	●
Runs in background mode	●	●	○	○	●	●
TRANSMISSION FEATURES						
Transmits directly from scanner	●	●	○	●	●	●
Sends current screen in response to PrtSc	○	○	○	○	○	●
Saves current screen to file	○	○	○	○	○	●
Directs printer text output to fax	○	●	○	○	○	○
Directs printer graphics output to fax	○	●	○	○	○	○
Saves printer text output to file	○	●	○	○	○	○
Saves printer graphics output to file	○	●	○	○	○	○
Converts to	Dr. Halo, GEM Paint, Microsoft Paint, .PCX, TIFF	ASCII, .PCX	ASCII, Dr. Halo, .PCX	.PCX	ASCII, .CUT, .PCX, TIFF	GEM, .IMG, PC Paint, .PCX, TIFF
Converts from	Dr. Halo, GEM Paint, Microsoft Paint, .PCX	ASCII, .PCX	ASCII, Dr. Halo, .PCX	ASCII, Dr. Halo, .PCX, Windows Paint	ASCII, .CUT, .PCX, TIFF	GEM, .IMG, PC Paint, .PCX, TIFF
Does automatic erasing after transmission	●	●	○	●	○	○
OTHER						
Compatible scanners						
Canon Image Scanner	● (IX-12)	● (IX-12)	○	● (IX-8, IX-12)	● (IX-12)	● (IX-12)
DEST	○	○	○	○	○	○
Hewlett-Packard ScanJet	●	●	○	○	●	●
Microtek	○	○	○	● (MS-200C, MS-300C)	○	● (MS-300A)
Panasonic	○	○	○	○	○	● (FX-RSS05)
Princeton Graphic Systems	○	○	○	○	○	● (LS-300A)
Other	Mitsumi DFI hand scanner	Brook Trout IX-12	None	Digitach hand scanner	None	AT&T Overview, Datascopy, IBM 3117, Riosh, ShapeScan SS-240
Generates letterhead	○	●	○	●	●	○
Generates custom fonts	○	●	○	○	●	○
Includes standard modem	○	○	○	○	○	●

— Editor's Choice ● — Yes ○ — No N/A — Not applicable: this product converts files during transmission without creating a fax format file



"Remote access to my PCs!"

"Ashton-Tate, Borland, IBM, Lotus, Microrim, Novell and 3Com all use Close-Up for their remote support. And now I know why. What a powerful management tool!"

It's true. Every major hardware and software manufacturer that offers remote services and support uses Close-Up.* Here's why. Close-Up gives you versatility, ease of use and reliability. It lets you work in tandem with your associates, share their screen and keyboard, access their DOS and run programs on their computer, *all remotely*. Business solutions. Just imagine the possibilities.

Customer Support

Take IBM for example. Our agreement covers over 100,000 copies of Close-Up for their support centers. Now IBM personnel can use their PCs to dial a customer's PC and be connected to their mini or mainframe. Linking

screens and keyboards as one unit. IBM and their customers can now diagnose problems together. *Simultaneously.*

Remote Order Entry

Novell uses Close-Up for its entire North American order/entry system. Their regional offices can call into any one of the 45 central office workstations running Close-Up and become part of Novell's order entry network. With file server access at full network speeds, 24 hours a day. And, using our print feature, reports are printed *remotely* at the regional sites.

Franchise Training & Support

Companies like Computerland, Kwik Kopy and PIP are opening new stores all the time. With Close-Up, they are able to train new employees, set up operating procedures, and monitor results instantly from their corporate offices. In fact, Computerland supports its large dealer network by using Close-Up with its Store Management System.

Point of Sale

Softsel uses Close-Up exclusively for their new Dial-Up SalesNet order/entry inventory system. They like Close-Up's error-corrected keystrokes and screens, ensuring that orders are entered accurately. Dealers can call in from around the country to check current inventory levels and review product/price descriptions. With ease.

CIRCLE 224 ON READER SERVICE CARD

Close-Up works at night ... so you don't have to.

Close-Up automates routine jobs day or night. Imagine an automated inventory and sales data system that calls all your offices, say 25 of them, each night (when phone costs are down). Back at your home office, Close-Up will run the inventory spreadsheet with a macro to consolidate the information. Close-Up then sends back the accumulated data. Even printing it out at each location for morning meetings. All this, while you sleep.

Join the Leaders

Close-Up is the clear choice of Fortune 500 companies and for compelling reasons. Why? Close-Up is quite simply more versatile, easier to use, and more reliable than any remote software on the market. Call us for an even closer look into:

- Remote Support ► Remote Order Entry
- Home to Office Communications ► PC to PC Communications ► PC to Mini or Mainframe
- PC to Information, Telex, & Electronic Mail Services ► Automated Communications
- Gateway to LANs

Call: 805/964-6767

*Norton-Lambert**

PO Box 4085, Santa Barbara, CA 93140 USA

Telex 709170

Copyright Norton-Lambert Corp. 1988 IBM/PC/XT/AT, PS/2 and Compatibles



■ FAX SYSTEMS



FACT FILE

AT&T Fax Connection AT&T

1 Speedwell Ave.
Morristown, NJ 07920
(800) 247-1212

List Price: \$995; *PagePower* software, \$295 (\$200 if bundled with board).

Requires: 512K RAM; hard disk, CGA, EGA, VGA, or Hercules monochrome graphics adapter (color with *PagePower* software); DOS 2.1 or later (DOS 3.0 or later required with *PagePower* software).

In Short: Excellent hardware that can't decide what kind of software it wants. The software supplied handles basic functions from the DOS command line; the optional *PagePower* software offers advanced functions in a more convoluted style.

CIRCLE 397 ON READER SERVICE CARD

A separate landscape-mode sending program sends ASCII files in pages of 132 columns by 66 lines. Another program drives the AT&T SC-60 scanner and creates files in fax format that you then send with the sending program. And a screen grabber is available to capture a text or graphics screen and convert it into a fax format. You have the option of converting a white-on-black screen into a more readable black-on-white.

Receiving is just as straightforward. You can set the board to wait for a transmission or to receive on command. A simple viewer gives you no control over scale and probably won't show you enough of the page to make the program worthwhile, but at least you can flip the image if it came in upside down. You'll use the print program instead of the viewer in most cases. The software sends and prints at generally impressive speeds.

IGNORE AND PAY EXTRA? AT&T says that it limits the software packed with the board to these simple functions so that VARs can devise their own software packages for customers. AT&T suggests that

themselves, AT&T seems to be charging extra for capabilities that other vendors supply with the board.

PagePower has capabilities to spare. AT&T wrote this impressive integrated set of fax, scan, draw, and communications programs to run under *Microsoft Windows* (a runtime version is supplied with the program), and *Windows*'s graphics interface is ideal when viewing or editing a fax file. And the mouse speeds things up when you select files from a menu. *Windows*, however, is less than ideal when you perform character-based functions like editing a phone list or typing in a time for a transmission.

The fax software in *PagePower* works with a resident scheduler, so you don't have to stay in *Windows* to send or receive. It can use the TIFF format to exchange files with its built-in draw program, and you can use the *Windows* clipboard to exchange graphics from other formats. Strangely, the draw program locked up the computer when I used it with a copy of *Windows* installed for a Hercules board, although it worked perfectly with VGA and EGA cards.

POWERFUL BUT REGRESSIVE

Powerful as it is, *PagePower* takes a step backward from the software included with the Fax Connection board in some respects. You have to preconvert ASCII files into fax format before sending them—a step that the board's less sophisticated software makes unnecessary. Furthermore, all functions now require you to tumble down a cascade of menus before you can complete them, rather than working from the DOS command line. The only way you can send faxes without using *PagePower* is by using a command-line program that drives a scanner but won't work with disk files.

We tried to load both *PagePower* and the software supplied with the board on the same machine, but the two did not coexist. The ideal software for AT&T's superb hardware might be neither the current ver-

BROOK TROUT TECHNOLOGY INC. FaxMail 96

What makes Brook Trout's \$599 FaxMail 96 such a good catch? Well, Brook Trout offers two user interfaces: an attractive menu-driven system for those who need the hand-holding, and a sophisticated command-driven interface for those interested in automating fax transmission. It also incorporates a proprietary print capture utility that lets you redirect any LPT1 output from any application to a Group 3 fax format file. Essentially, this means that if you can print it, you can send it.

That's not all. Brook Trout offers the supporting tools every fax board should include. There's a built-in mini-word processor, powerful enough to send text messages without having to darken the directories of your word processor. There's a graphics editor that handles simple cut, paste, and view functions. And finally, Brook Trout has a useful facility for adding existing signature and letterhead files to the body of your text.

EFFORTLESS INSTALLATION

The Brook Trout system includes a full-length board, three disks of software, and a phone cable. Software and hardware installation is effortless. The board comes configured with a certain port address and interrupt settings, but these can be changed easily through DIP switch and jumper settings.



FACT FILE

FaxMail 96

Brook Trout Technology Inc.
110 Cedar St.
Wellesley Hills, MA 02181
(617) 235-3026
List Price: \$599

Requires: 256K RAM (hard disk recommended for storing images); CGA, EGA, or Hercules graphics adapters; DOS 2.0 or later.

In Short: A fax package that includes all the tools of the trade: both a menu-driven and a



“We need Accounting Software
we’ll never outgrow.”



“You need Macola. Here’s why.”

Choosing the right accounting software can be a complicated process. And due to the time and money invested, this decision should be made only once—regardless of how much your business grows.

There are plenty of reasons why you’ll never outgrow Macola Accounting Software. Here’s just five.



Reason 1: Flexible and Powerful. In the words of PC Magazine, Macola Accounting Software “is at the top of its class... a flexible, powerful system that is well suited to many different businesses.”

Reason 2: Fourteen Integrated Packages. It’s modular, so you can add more computing power as your needs grow, from simple accounting to full scale accountability.

Accounting General Ledger—Accounts Receivable—Accounts Payable—Payroll—Assets/Depreciation

Distribution Inventory Management—Customer Order Processing—Purchase Order and Receiving

Manufacturing Bill of Material Processor—Material Requirements Planning—Master Scheduling—Shop Floor Control—Job Costing—Standard Product Routing

That’s not all. There’s a Report Writer that allows customized reporting and can easily transport data files to popular spread sheet, word processing and database programs.



Reason 3: The best multi-user LAN compatibility. No other software can match

Macola’s 15 years of maturity in mini and micro Local Area Network (LAN) environments. Today, Macola is the most advanced accounting software for LANs. That’s why Macola earned LAN Magazine’s “Product of the Year” honor ... for the second year in a row.

Reason 4: Unparalleled Speed and Data Integrity. Macola Software is the only high-end accounting software written in Micro Focus COBOL... for maximum speed and data integrity. Source code is available. IBM has licensed Micro Focus COBOL

as its SAA standard for the new PS/2 and OS/2.

Reason 5: Comprehensive Support. Toll-free 800-line support is available from Macola. Or, utilize Macola’s nationwide network of authorized resellers for local training, customization and hands-on support.

These are just five reasons why you’ll never outgrow Macola Accounting Software. For more reasons, more detailed information, “live” demonstration packages and an authorized reseller in your area, call today:

1-800-468-0834 (USA)
1-800-336-8337 (CANADA)

CIRCLE 263 ON READER SERVICE CARD

MACOLA®
SOFTWARE

333 E. Center St.
P.O. Box 485
Marion, Ohio 43301-0485
614/382-5999

Accounting Software
You’ll Never Outgrow.

■ FAX SYSTEMS



The \$599 Brook Trout FaxMail 96 system includes a full-length 9,600-bps board, three disks of software, and a phone cable. The board comes configured with a certain port address and interrupt settings, but these can be changed easily through DIP switch and jumper settings.

You can transparently access the software's executable programs via the menu system, or you can run each, with a series of arguments, from the DOS command line.

Brook Trout relies on a RAM-resident scheduler module to send and receive faxes. If the resident portion, `REXXMIT.EXE`, is not loaded, you can still print a fax message or view the activity log, but you cannot send or receive messages. Running in the background, the 40K resident scheduler remains in memory; when running in the foreground, it is invoked and then disabled.

ASCII, *PC Paintbrush*, and print capture files can either be converted before transmission or be converted and sent in one fell swoop. When we scanned *PC Paintbrush* files for transmission, all was fine. However, when we used existing *PC Paintbrush* files for transmission in fine resolution, they were elongated to twice their size. You can remedy any aspect ratio problem by using Brook Trout's graphic editor software, issuing a command-line argument to adjust the on-screen or printed size. And according to Brook Trout's technical support staff, using the vendor's print capture utility will also yield more consistent results.

MENUS EASE THE WAY Detailed menu selections make routine fax transmissions a pleasure. Main menu selections are augmented with pop-up menu boxes. Using the send menu, for example, you

can specify a delayed transmission or use a phone file to insert a frequently dialed number. You can attach a previously created letterhead or signature through the menu selections. You can receive a fax automatically in the background, where every file is logged in as `FAX00*.301`, or you can choose to receive manually and enter a filename of choice.

The only confusing aspect of using the menus is their extensive use of Journals. Within the submenus you can access three different Journal commands; each offers a different type of activity summary.

Leaving the menus is a different story, since the documentation is particularly sparse when it comes to explaining the command line arguments. For example, the software's ability to do dithering was undocumented, the printer scaling argument was wrongly documented, and the creation of a distribution list was poorly documented.

MONITORING TRANSMISSIONS

Feedback is sent to the user during transmission, and reception is top caliber. A pop-up status box lets you monitor the messaging process, informing you when your machine is dialing or waiting for an answer, when a ring is detected, and when handshaking is going on. You can also view the transmission packet by packet and can watch as your reception is verified.

The full-screen text editor, *Write*, while by no means a full-featured word

processor, is a useful feature. It uses a *WordStar*-like command system, handles 128K files and even includes split-screen editing. It also serves as a tool to create ASCII files for maintaining distribution lists.

The spartan command-driven graphics editor, misnamed *Supershow* (it should be called *Minishow*), lets you view, scale, cut, paste, and flip a graphics image. Although this graphics editor won't let you modify or manipulate an image to the extent that *PC Paintbrush* will, it has most of the features that most users will need most of the time.

The Brook Trout FaxMail 96 is a complete package supported by a top-notch technical staff. That became apparent during testing, when we began to question the Group 3 compatibility of our remote fax machine, a Canon Faxphone 20. Brook Trout ran a debug on a transmission it sent to the Faxphone and helped us pinpoint the incompatibility. The vendor can also handle customer requests for some unusual fonts (such as Icelandic and Hebrew) and will even create letterhead and signature files for those customers without scanners. This review caught the company between documentation upgrades, so we worked with an unfinished document. But even so, it's safe to say that Brook Trout is a good catch. —Robin Raskin

BROTHER INTERNATIONAL CORP.

Brother IntelliFAX

The \$999 Brother IntelliFAX board is largely the same as the \$795 Quadram JT-Fax 9600. That's because Brother International Corp. and Quadram's Asher Fax Products Division cooperate in the development of fax hardware and software. So how can you tell them apart—other than by price? Well, for one thing, although there is no difference in their fax-oriented features and functions, the IntelliFAX and the JT-Fax 9600 are distinguishable by their differing firmware and menu structures. Beyond that, the 3½-length 9,600-bps IntelliFAX comes with one standard combination that the JT-Fax 9600 doesn't: a 1,200-bps Hayes-compatible modem and *Mirror II*, a *Crosstalk*-like communications package.

The Network Hardware Solution.

Famous CORE Reliability. CORE file servers, workstations, subsystems and peripherals give you the reliability needed to protect your network investment.

Powerful File Servers. The ATomizer 386/20 and 386/25 floor-standing file servers provide mini-computer performance with five full-height or ten half-height drive slots and up to 2.8 gigabytes of capacity.

The ATomizer 386/20 desktop file server (not shown) provides up to 1.4 gigabytes of capacity. All offer uncompromised growth capability.

High-Performance Workstations. Complete your network configuration with ATomizer 286/12 full-size and small footprint workstations. Both increase user productivity with fast system performance and high-speed network throughput.

High-Capacity Peripherals. CORE 90 to 700MB, 9 to 16ms disk drives, high-speed 10 or 15MHz controllers and external LAN subsystems let you upgrade a system to a file server without sacrificing performance. Protect your valuable data with COREtape backup units.

Compatible with such operating systems as Novell, Star LAN and 3Com, as well as industry-standard cabling, cards and other network components.

Contact your nearest dealer or CORE representative today.

Northeast Region:
203/357-1339

Southern Region:
407/997-6055

Central Region:
312/439-0511

Western Region:
213/312-8130

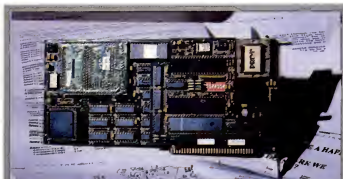
International Sales:
407/997-6044 FAX: 407/997-6009

Distribution through GBC Distributors, Gates, Graydon Sherman, Ingram, MICRO D-TPD and Vitronix. In Canada, contact Markham International.

Products listed are registered trademarks of their respective manufacturers. CORE, ATomizer and COREtape are registered trademarks of CORE International, Inc.

CORE[®]
INTERNATIONAL

■ FAX SYSTEMS



The \$999 Brother IntelliFAX board is largely the same as the \$795 Quadram JT-Fax 9600, but the two are distinguishable by their differing firmware and menu structures. Beyond that, the $\frac{1}{2}$ -length 9,600-bps IntelliFAX comes with one standard combination that the JT-Fax 9600 doesn't: a 1,200-bps Hayes-compatible modem and Mirror II, a Crosstalk-like communications package.

sive list of features as the JT-Fax 9600, such as transaction logs, calling groups, printer capture, screen capture, the ability to incorporate header and signature files, normal and fine resolution, normal and compressed type, and gray scaling.

BETTER MENU STRUCTURE While there's no fax operation that you can do with the Brother IntelliFAX that you can't do with the Quadram JT-Fax 9600, the IntelliFAX's menu structure is slightly better. Making this distinction is a bit like splitting hairs, since the JT-Fax's menus are well organized and self-explanatory. The difference between the two implementations is that the IntelliFAX uses a horizontal-moving-bar menu for major functions with pull-down menus for options, while the JT's menu start with a vertical menu and then use overlapping vertical pop-ups. Both work well, but the



FACT FILE

Brother IntelliFAX

Brother International Corp.
8 Corporate Pl.
Piscataway, NJ 08855
(201) 981-0300
List Price: \$999

Requires: 640K RAM; DOS 2.1 or later.
In Short: Functionally similar to (and \$200 more than) Quadram's JT-Fax 9600 in terms of fax functionality, the IntelliFAX system includes a 1,200-bps Hayes-compatible modem with communications software and also uses a slightly better menu structure. It's worth the extra money only if you need a modem and can settle for a 1,200-bps unit.

CIRCLE 300 ON READER SERVICE CARD

Of course, you can spend an additional \$200 on an optional modem for the JT-Fax 9600, but currently you won't get any software to go with it. If you already have a modem, there's no need to spend the extra \$200 in either case. And even if you do need a modem, you may not want to settle for a 1,200-bps model. Still, if you plan to use a modem only occasionally and don't have a pressing need for higher speed, the one that comes with the IntelliFAX will do the job—and won't take up an extra slot in your PC.

WORK-ALIKES There's no significant difference between the IntelliFAX's and JT-Fax 9600's performance: hard-copy output and transmission times weren't much different. For example, sending our ASCII test file directly from one PC to another took 84 seconds on the IntelliFAX and 80 seconds on the JT. Both units printed the received fax in 92 seconds.

The IntelliFAX also shares the JT-Fax 9600's foreground, background, and TSR operations. Both programs can stay out of the way when sending or receiving faxes in the background, slowing down operations in other software but not bringing everything to a halt, as did the original JT-Fax. While you can force the program to pre-convert files to fax format before transmission, usually conversion takes place at the time of transmission, saving disk space.

The boards dealt identically with our error-handling tests, preventing us from sending a fax to a computer that was unsuccessfully trying to log on to an empty disk drive or that was paused with a Ctrl-S keystroke combination, and allowing us to send a fax to a computer while it was printing. Both the IntelliFAX and the JT-Fax 9600 also reacted well when we rebooted the computer while it was receiving a fax; in each case the call was automatically rescheduled by the sender.

The IntelliFAX has the same impres-

Overall, the
*IntelliFAX is a fine
unit with a great
array of features.*

IntelliFAX has the edge on clarity.

The IntelliFAX supports the same printers as the JT-Fax, which means most dot matrix printers (notably those that are IBM or Epson compatible) and the HP and Brother laser printers and compatibles. Supported scanners include units by Brother, Canon, Chinon, Princeton Graphics Systems, and Hewlett-Packard. The IntelliFAX also works with virtually all Group 3 fax machines.

Overall, the Brother IntelliFAX is a fine unit. It's easy to install and use, performs very well, and has a great array of features and functions. If you don't need a modem, you might want to look at the JT-Fax 9600 instead, since you'll get the same functions for \$200 less. But if you do need a 1,200-bps modem and don't want to give up a slot, this is the board to consider.

—Bruce Brown

AT ?



PS/2 ?



mitac
PARAGON 286VE !

See us at **BOOTH 2808**
COMDEX/Spring '89
April 10-13, 1989
For display of exciting line of MCA-
Compatibles and small-footprint PCs



16 MHz VGA Powerstation

Mitac's innovative small-footprint Paragon 286VE gives you the convenience and compatibility of the "AT" standard and the best features of the emerging PS/2 technology. That means you don't have to worry about obsolescence in this period of changing standards. Best of all, the Paragon 286VE is available now! Your bridge between the AT and PS/2 platforms, Mitac's 16 MHz Paragon 286VE is a powerful computer for general business applications like spreadsheets and desktop publishing. Brilliant built-in VGA graphics give you eye-soothing resolution for design

Specifications	
CPU	80286-16
RAM	1-8 MB
Graphics	VGA+
FDD	1
SDD	2
Exp. slots	6
Hard disk	0-40/160 MB

and planning applications. And 3-1/2" and 5-1/4" floppy disk drives mean you will never have to add an external drive.

The Mitac's Paragon 286VE saves you money by accepting your existing library of AT and XT cards, peripherals and software. And it offers flawless performance under MS-DOS, OS/2 and SCO-XENIX/286 operating systems. Of course, the Paragon 286VE is backed by a full one-year warranty, TRW service and Mitac's technical support hotline. To take a look at one of the most advanced personal

computers available today, ask your local dealer about the Mitac Paragon 286VE or call Mitac for further information at **800-MITAC-US (648-2287)**.



mitac

When reliability is a decisive factor

Mitac's Paragon series of small-footprint computers includes XT-, AT- and 386-compatible microcomputers. The Paragon computers are distributed in the United States by MicroAmerica, Schweper Electronics, Gates/FA, and authorized Mitac dealers and VARs. Canadian distribution is handled by TLS.

IBM, XT, AT, PS/2 and VGA are trademarks of International Business Machines. MS-DOS, OS/2 and XP/86 are trademarks of Microsoft Corp. SDD is a trademark of the Santa Cruz Operation.

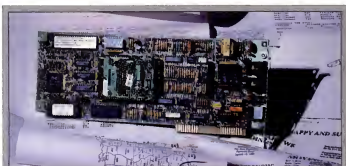
■ FAX SYSTEMS

THE COMPLETE PC The Complete Fax/9600

The Complete Fax/9600, or CFAx, is a prime example of what a PC-based fax package ought to be but too often isn't: almost as simple to use as a fax machine, but filled with features that require a computer. Even at \$699 (or \$399 for the 4,800-bps version), that package almost qualifies as a bargain.

By any measure, CFAx is strong on features. A partial list includes background operation; the ability to capture Epson FX text and graphics printer output from an application program and send it as a fax; the ability to convert files from PC Paintbrush Plus, Dr. Halo, and Windows Paint format; the ability to schedule fax transmissions and create distribution lists; and the ability to transfer binary files at 9,600 bps with another CFAx system. Of special note is a memo feature that lets you create and fax a short note completely within the fax program.

DOING IT YOUR WAY At least as important as the sheer number of features is that CFAx often offers more than one way to handle a given function. For example, you can scan a full-page image and send it in a single step, or you can convert it as a separate step from sending. If you scan the



The \$699 Complete Fax/9600 allows background operation. It can also capture Epson FX text and graphics printer output from an application program and send it as a fax; convert files from PC-Paintbrush Plus, Dr. Halo, and Windows Paint formats; schedule fax transmissions and create distribution lists; and transfer binary files at 9,600 bps with another 1/4-length Complete Fax/9600 system.

image as a separate step, you can designate resolution, image type (line drawing or photograph), and dithering scheme (for gray-scale images).

Very much on the plus side, CFAx offers a menu structure that makes most features easy to find when you need them and easy to ignore when you don't. With few exceptions, the program unfolds naturally, presenting appropriate choices at the right time.

For example, suppose you want to fax an ASCII file. You have only to pick Send FAXes from the first-level menu, then enter the filename and phone number in the Send screen. If you can't remember the filename, you choose List, then DOS Directory, enter the name of the directory to look in, and pick the file from the list. Similarly, you can type the phone number, or you can ask to see a list of entries in the phone book and choose from that list.

Also noteworthy is a context-sensitive help feature that is informative enough so that you may never need to look at the manual. And in keeping with the rest of the package, the manual is also well organized and well written.

MAKING IT EASY Even installation is painless. The 1/4-length board includes a bank of DIP switches for controlling the CFAx address and interrupts. The settings are fully covered in an appendix in the

manual, though in most cases you should be able to use factory settings and simply plug in the board.

Installing the software is even easier. An install program asks a few questions about your system—including type of printer and scanner if you have one—then copies all files to the directory of your choice. If you change your hardware, you simply rerun the install program from your hard disk.

Once installed, CFAx runs as two modules. The background module answers the phone for incoming faxes, sends outgoing faxes, and, if you specify, prints faxes automatically. The foreground module allows manual control over such functions as scanning, designating files to send, and creating distribution lists. The background module also offers a pop-up screen that lets you send faxes from within virtually any program.

NEARLY PERFECT On PC Labs' error-handling tests, CFAx performed well, but with one exception. When we logged on to an empty floppy disk drive and then responded to the Abort, Retry, Ignore message with an "I," the system hung. A technical representative from The Complete PC said that he could not reproduce the problem, but we were able to produce it repeatedly on two different computers.

As of this writing, CFAx supports full-



FACT FILE

The Complete Fax/9600

The Complete PC
521 Cottonwood Dr.
Milpitas, CA 95035
(408) 434-0145
List Price: \$699; Hayes-compatible modem,
\$99.

Requires: 512K RAM; hard disk; IBM PC,
XT, AT, PS/2 Model 25 or 30, or compati-
ble; CGA, EGA, VGA, or Hercules graphics
adapter; DOS 3.1 or later.

In Short: The Complete Fax/9600 manages
to offer both an abundance of features and a
menu structure that is easy to learn and use.
Some of its more notable features are back-
ground operation, the ability to capture print
output to send as a fax, and the ability to con-
vert files from PC Paintbrush Plus, Dr.
Halo, and Windows Paint formats.

CIRCLE 400 ON READER SERVICE CARD

It's 11:05 am. If you had our accounting software, you'd know where your business is.

11:05

"Great, back orders are down. Now let's push those sales."

11:06

"Gross Margins look good. We can pick up sales volume with some promotions."

dPayables MultiNet Praxis Products, Inc. Business Status Report as of 09/26/88	
dInvoice/dStatements	dPayables
Current Balance: 186532.43	Current Balance: 54632.21
PTD Billings: 55768.15	PTD Payables: 23656.44
PTD Receipts: 53422.23	PTD Payments: 25978.84
PTD COGS: 22475.84	Approved to Pay: 1285.95
Inventory Value: 158412.57	
dOrders	dPurchase
Open Orders: 8253.76	Open POs: 49783.56
PTD Orders: 54725.43	PTD Orders: 45125.33
PTD Shipments: 55835.12	PTD Receipts: 14937.49
PTD Gross Margin: 33292.31	Net Cash Forecast: 18378.62
Enter Choice (Forecast/Recalculate/Print/Quit) →	

11:07

"Let's forecast where these numbers will be at the end of the month."

11:08

"Last week's cash forecast was \$4,000. We're looking much better. We can put some into CD's."

11:09

"Cash receipts are up, I can approve a few more P.O.'s."

11:10

"Purchase Orders are close to sales this month. I'll call Mary and put the brakes on any more P.O.'s for a while."

There's a lot to a business, and it's tough to know where all of it is, all of the time.

That is, unless you have the Database Accounting Library™ from SBT.

It offers a Business Status Report that is a complete control panel for your business.

A set of instruments that gives you up-to-the-second status on what you're selling and what you're buying. On what you owe and what you're owed. Right up to the last item entered.

Which means you know virtually everything about where your business is, right now.

And with a single keystroke you can project those current results to the end of the month.

So you can decide when to trim and when to spend.

We also provide 15 different accounting modules to choose from. That means your business gets exactly the applications it needs, and only those it needs.

Modules start at just \$295, run on all popular computers and multi-user environments, and come with an unprecedented five year warranty.

So at 11:05, or any other time of the day, the SBT Database Accounting Library can help you know exactly where your business is.

Call your nearest SBT dealer today. Or call SBT at 800/227-7193 (415/331-9900 within California). Or write us at One Harbor Drive, Sausalito, CA 94965.

CIRCLE 470 ON READER SERVICE CARD

**More than accounting,
we stand for better business.**



© Copyright SBT Corp. 1988. Trademark/owner: Database Accounting Library/SBT Corp.



■ FAX SYSTEMS

page scanners from only four vendors: Hewlett-Packard ScanJet, Canon IX-12, Microtek (any model), and DEST (any model). In addition, the program will work with The Complete PC's Hand Scanner for scanning less than a full page. According to a Complete PC representative, by the time you read this, the company will be offering its own full-page scanner.

Scanner control is superb. In our tests using the HP ScanJet, the sample color wheel and photo retained far more detail and shading than in most other fax packages—or scanner packages for that matter. If you need to fax photos frequently, this is an important issue to consider.

As should be clear, The Complete Fax/9600 not only offers a full range of features but does so in an attractive package that is easy to learn and use. Whether your faxing needs are occasional, or you want to supplement your standalone fax machine with computer-based capabilities, the combination offered by The Complete Fax/9600 is hard to beat.

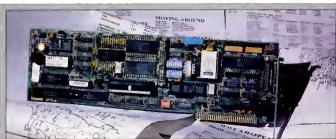
—M. David Stone

DEST CORP.

Facsimile Pack

Given DEST Corp.'s well-established reputation as a manufacturer of OCR scanners and software, it was only logical that it should branch out into the fax market. The vendor's latest entry is the Facsimile Pack, a minor revision of DEST's EZ-FAX, which was reviewed in *PC Magazine's* last roundup of fax boards (for the full text of that review, see the June 28, 1988, issue). According to a DEST representative, DEST improved the system's communications capabilities, leading to fewer transmission errors. It also dropped the price of the system from \$1,495 to \$995, which puts the price of this full-length board more in line with that of other boards.

The Facsimile Pack's software features a logical menu structure, excellent context-sensitive help, and the ability to convert and send ASCII, Dr. Halo, and PC Paintbrush files in a single step. The hardware includes an on-board microprocessor with 8K of RAM to manage background operation. Both software and hardware are easy to install. The factory-set DIP switch settings should work in most cases. You



The S995 Facsimile Pack from DEST Corp. includes a full-length 9,600-bps board that has a built-in microprocessor with 8K of RAM to manage background operation. The accompanying software features a logical menu structure, excellent context-sensitive help, and lets you convert and send ASCII, Dr. Halo, and PC Paintbrush files in a single step.

can plug an optional scanner like the DEST PC Scan 1000 or PC Scan 2000 directly into the board.

SCHEDULES AND PHONE BOOKS

If you need to handle a high volume of faxes, you'll be glad to know that the Facsimile Pack's scheduler and phone book have no size limit other than that imposed by the disk space that is made available to them, and both are easy to learn and use. To schedule a transmission, for example, you have only to select T for Transmit and then T, F, or S for Text, Fax file, or Scanned pages. You then enter the name of the file and the phone number by typing them in or by popping up a list, highlighting your choice, and hitting Return. You can also enter an ID name associated with a phone number.

Also helpful is the Facsimile Pack's ability to intercept printer output from any application and send it as a fax. A related feature lets you use your word processor's mail-merge function to create distribution lists by adding a command in your master document. The Facsimile Pack will read phone numbers from a data file and merge-fax the documents rather than merge-print them. You can also create distribution lists through a DOS batch file.

Any fax package can hog large amounts of disk space. Facsimile Pack has options for deleting files automatically after they have been printed, sent, or otherwise processed. Another option lets you delete files after a specified number of days. And



FACT FILE

Facsimile Pack

DEST Corp.
1201 Cadillac Ct.
Milpitas, CA 95035
(408) 946-7100

List Price: \$995

Requires: 640K RAM (140K of which is free RAM); hard disk; IBM PC, XT, AT, PS/2 Model 30, or compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 2.0 or later.

In Short: Facsimile Pack offers ease of use and the ability to merge fax documents with data files by way of your word processor. While it can handle a high volume of faxes well, it suffers from many small oversights: for example, it can't receive faxes properly sent at high resolution.

CIRCLE 401 ON READER SERVICE CARD

since the program's display feature requires the creation of a separate version of the file, it's worth noting that you have the choice of creating such files automatically, manually, or not at all.

ERRORS AND SHORTCOMINGS

The Facsimile Pack could have fared better on the PC Labs error-handling tests. If you issue the Type command to a file and stop it with Ctrl-S or log on to an empty drive, the system will not acknowledge an incoming call until you restart the displaying of the file or fix the drive error. It will also let you reboot with Ctrl-Alt-Del during a



This little piggy loves MicroFax.

Because MicroFax™ from Datacopy lets you turn your PC into a fax machine for only \$695. A fraction of what stand-alone machines cost but with the same sophisticated fax capabilities. And that makes MicroFax the smart solution for the fax needs of any PC owner.

SIMPLICITY

MicroFax is simple to use. It's an add-on fax board for the PC which sends and receives documents worldwide at 9600 bps no matter what you're doing, because MicroFax operates unattended. Plus it works simultaneously while other programs are



running, so valuable work time is never wasted.

SOPHISTICATION

MicroFax is the first true integration of fax and PC technologies. Now, you can communicate text, graphics and computer files to and from computers and fax machines with a 1200 baud Hayes® compatible ASCII modem.

Moreover, you can transfer computer files between PCs in considerably less time at 9600 bps.

In total, that's a powerful line of communication.

BYTE MAGAZINE

And we're not the only ones who think so. Recently BYTE Magazine reviewed the Datacopy MicroFax and judged it:

"...the standard against which to measure other PC fax cards."

MicroFax is the standard against which to measure other PC fax cards. MicroFax's documentation is straightforward, and Datacopy users have a clear idea of the proper role of a fax card. After crawling through thousands of pages of documentation, this was the only...

So consider MicroFax the most sophisticated and convenient fax card available. And

you'll love us for more than just the money.

For more information, call Datacopy direct at (800) 821-2898.



DATACOPY

A Xerox Company

MicroFax is a trademark of Datacopy Corporation. All other product names are trademarks or registered trademarks of their respective holders.

CIRCLE 247 ON READER SERVICE CARD

■ FAX SYSTEMS

fax transmission. What's more, the manual warns you that using **FORMAT**, **DSKCHK**, or **DISKCOMP** during a fax transfer will result in loss of data.

The program has other shortcomings as well. For example, high-resolution transmission and conversions from fax to graphics formats are available only from the DOS prompt. Although running Facsimile Pack from DOS is a nice option—especially to let you batch activities that you run frequently—these features should also be available from the menus.

Also be aware that high-resolution mode is supported only for transmission, and only for converted graphics files. The board interprets all incoming faxes as low resolution (100 vertical lines), so that a high-resolution fax will expand to twice its original height. Other limitations are the lack of graphics features beyond a simple display function and error codes that are limited to arcane numbers (though these are thoroughly explained in the manual).

If security is an issue, you can purchase an optional encryption chip from DEST for \$195. Also optional is a \$129 Bell 212 1,200-bps modem that installs piggyback on the fax board. There is even a version of Facsimile Pack for use with Novell networks. A new version of the program is expected by mid-1989. According to DEST, this will offer EMS support, an unload feature to clear RAM space, and support for legal-sized printouts.

In its current version, the Facsimile Pack clearly has some limitations, and even at \$995 seems a bit expensive for the features it offers. But the program is easy to set up and use, and it handles heavy fax activity well. For those with high-volume faxing needs, it is certainly worth looking at.—John Britton

GAMMALINK GammaFax

In its earlier incarnation, GammaLink's GammaFax was a hacker's delight but a casual user's despair. A script language let you automate a host of powerful functions, but even many simple operations had to be performed through unwieldy command strings at the DOS prompt. With its current version, the GammaFax software has entered the modern world, offering com-



The \$695 GammaFax half-length 9,600-bps card from GammaLink comes with menu-driven software that has copious context-sensitive on-line help, plus a powerful script language for automating complex procedures. An optional CADFax package (\$395) converts AutoCAD and HPGL files to fax format.

pletely menu-driven operation and copious context-sensitive on-line help.

Besides the standard \$695 GammaFax half-length card that we tested, GammaLink offers the \$895 GammaFax Plus, which includes a second modem for standard communications functions, and the \$1,095 GammaFax CP, which sports an on-board 80188 microprocessor and 256K RAM. The GammaFax CP was unavailable for testing, but according to the vendor it offers speedier performance in background mode and can convert files to fax format on the fly while transmitting them. You can also have more than one GammaFax CP operating simultaneously in a single computer. An optional CADFax package (\$395) lets you convert AutoCAD and HPGL files to fax format.

SIMPLE BUT SOPHISTICATED The GammaFax software makes transmitting disk files about as simple as it can be. You just type in the filename and the phone number or select the file from an on-screen directory and choose the phone number from one of the phone books you can create. You can also tag several files and several different phone numbers to create distribution lists, which you can save for reuse later.

A third transmission option exemplifies the level of sophistication the GammaFax

PC
magazine

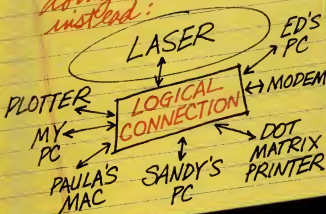
FACT FILE

GammaFax
GammaLink
2452 Embarcadero Way
Palo Alto, CA 94303
(415) 856-7421
List Price: \$695
Requires: 512K RAM; hard disk; IBM PC, XT, AT, PS/2, or compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 3.0 or later.
In Short: GammaFax combines power and flexibility with a simple, easy-to-use menu system. It should satisfy the needs of users at all levels of sophistication.
CIRCLE 402 ON READER SERVICE CARD

software has achieved. You can enter selection criteria for the Class and Category fields of a phone book record and then automatically broadcast files to each number that meets the criteria.

The program does everything else automatically. It determines each file's format, converts it to fax format, and then dials each number. If it can't get through, it waits a user-specified length of time and then redials the number of times you have specified beforehand. You can even opt to have it put any unsuccessfully dialed phone numbers at the end of the queue for

*Don.
Per your question
about getting a LAN
for your department -
You might consider
doing what we did
instead:*



Network without a network.

Before buying a LAN, take a hard look at your company's needs. Then take a look at the Logical Connection.

It could be all the network you need. A peripheral sharing device. Simple and affordable. No cards. No file server. No node disks. Just your equipment, logically connected for economy and ease of use.



Connect up to six PCs on each Logical Connection. To lasers. Printers. Plotters. Modems. Switch from one device to another from any connected PC. Pop up the on-screen menu, and it's done.

Link as many as 45 Logical Connections to really expand your connectivity power. Up to 225 users sharing

those costly peripherals.

Make the logical choice. Network without a network. For as little as \$700.

From the makers of Fastback Plus.



**All the network
most users need.**



CIRCLE 288 ON READER SERVICE CARD

Call for details on our Corporate/Dealer Evaluation Program

Fifth Generation Systems, Inc. • 11200 Industriplex Blvd. • Baton Rouge, LA 70809 • (800) 873-4384, (504) 291-7221



Benchmark Tests: Fax Boards

Since we last tested fax boards for PCs, the field has broadened and the quality has improved. But the more things change, the more they stay the same: the performance times yielded by this crop of fax boards proved similar to those of the last group.

For the sake of comparison, we tested the transmission time between two standalone fax machines, each of them a Canon FaxPhone 20. In the PC-Fax Transmission test, only five of the 15 tested fax boards (the AT&T Fax Connection, the Pamris FA10, the FaxMail 96, the Panasonic FX-BM89+ Fax Partner, and the Connection CoProcessor) were faster than the standalone pair with its 77-second timing.

The GammaFax, which produced very poor timings on PC Labs' Fax Print benchmark test last year, now achieves a respectable score of 99 seconds. Several other boards also substantially improved their print speeds, leaving behind The Complete Fax/9600, which once again delivered a poor print time of almost 4 minutes.

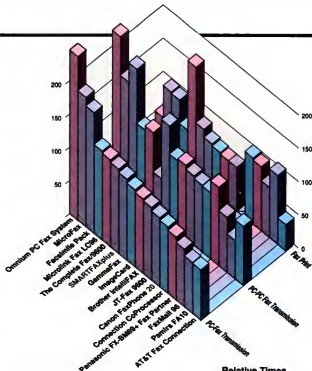
Except in the case of the AT&T Fax Connection, fast printing did not necessarily coincide with fast transmission. Not only was the AT&T Fax Connection the fastest in the PC-Fax Transmission benchmark test, it was also the fastest in our Fax Print benchmark test, delivering a paper copy of our 2-page fax transmission in less than a minute.

As in the past, some products were tested with the Canon FaxPhone 20 and others with the Ricoh FAX60, because a number of boards had trouble handshaking with the former machine. The choice of a receiving fax machine normally does not affect performance times.

The PC-Fax Transmission benchmark test times the transmission (without printing) of a 2-page letter in an ASCII text file. Each product is timed on an 8-MHz IBM PC AT, transferring the test file to a standalone fax machine.

The PC-PC Fax Transmission benchmark test times each package as it transfers the same file to an identically configured AT with the same model fax board. This test lets the package benefit from any proprietary features that might override the standalone fax standard.

The Fax Print benchmark test times the printing of the 2-page test letter received in the fax transmission benchmark tests. An HP LaserJet Series II is used for this test, and timing is measured from the issue of the print command to the completion of printing.



Performance Times
(Times given in seconds)

Relative Times
(Connection CoProcessor = 100)

	PC-Fax Transmission	PC-PC Fax Transmission	Fax Print
Omnium PC Fax System	182	170	71
MicroFax	144	126	137
Facsimile Pack	135	148	135
Microlink Fax LC96	99	86	86
The Complete Fax/9600	97	91	231
SMARTFAXplus	94	46	116
GammaFax	90	114	99
ImageCard	86	82	94
Brother IntelliFAX	83	84	92
JT-Fax 9600	81	80	92
Canon FaxPhone 20	77*	77*	N/A
Connection CoProcessor	74	76	139
Panasonic FX-BM89+ Fax Partner	70	90	135
FaxMail 96	64	63	105
Pamris FA10	57	44	145
AT&T Fax Connection	56	68	56

* Transmission between two standalone FaxPhone 20 machines.

N/A—Not applicable: the FaxPhone 20 does not print to an HP LaserJet, nor does it save fax output for later printing.

The output of a transmission to a fax machine from a PC may look better than what results when you send a document from one fax machine to another. The reason is that standard fax machines scan the document before sending it over the phone line, and some resolution is lost in the scanning process. PC fax skips the scanning process, sending the document file directly from your computer. The resolution of all faxed output conforms to the Group 3 standard of 200 dots per inch.

You can see the degradation in the image of a text file printed on the HP LaserJet Series II and sent from one fax machine to

another, compared with the quality of text files sent by the PC fax packages reviewed here. Of course, how well you like the output produced by a PC fax package may depend on the fonts the package uses. Those we tested have their own fonts, and the user has little control over their appearance. Note that 7 of the 15 PC fax packages—AT&T Fax Connection, FaxMail 96, Brother IntelliFAX, The Complete Fax/9600, GammaFax, JT-Fax 9600, and ImageCard—do not place a slash through the number 0 to distinguish it from the letter O.

HP LaserJet Series II

project before, you
over 7,500 words of
board and write a sh
is simple. With mul
ed the reviews to have

Fax machine

project before, you
over 7,500 words of
board and write a sh
is simple. With mul
ed the reviews to have

Omnium PC Fax System

project before, you
over 7,500 words of
board and write a sh
is simple. With mul
ed the reviews to have

SMARTFAXplus

project before, you're prob
over 7,500 words of advice
board and write a short
is simple. With multiple re
ed the reviews to have some
readers will be left with

Connection CoProcessor

project before, you'
over 7,500 words of a
board and write a sho
is simple. With mult
ed the reviews to have

MicroFax

project before, you'
over 7,500 words of a
board and write a sho
is simple. With mult
ed the reviews to have

GammaFax

project before, you're pr
over 7,500 words of advice
board and write a short
is simple. With multiple
ed the reviews to have some

Panasonic FX-BM89+ Fax Partner

project before, you'
over 7,500 words of a
board and write a sho
is simple. With mult
ed the reviews to have

Facsimite Pack

project before, you're
over 7,500 words of adv
board and write a short
is simple. With multipl
ed the reviews to have s

ImageCard

project before, you'r
over 7,500 words of adv
board and write a short
is simple. With multi
ed the reviews to have
readers will be left

FaxMail 96

project before, you'
over 7,500 words of a
board and write a sho
is simple. With mult
ed the reviews to have

MicroLink Fax LC96

project before, you'r
over 7,500 words of ad
board and write a shor
is simple. With multi
ed the reviews to have

Brother IntelliFAX

project before, you're p
over 7,500 words of adv
board and write a short
is simple. With multiple
ed the reviews to have so
readers will be left with

Pamira FA10

project before, you'
over 7,500 words of
board and write a sh
is simple. With mult
ed the reviews to have
readers will be left

The Complete Fax/9600

project before, you'r
over 7,500 words of ad
board and write a shor
is simple. With multi
ed the reviews to have

JT-Fax 9600

project before, you're
over 7,500 words of adv
board and write a short
is simple. With multiple
ed the reviews to have so
readers will be left with

AT&T Fax Connection

project before, you'
over 7,500 words of
board and write a sh
is simple. With mult
ed the reviews to have

■ FAX SYSTEMS

retry after it has attempted all other numbers.

Send and Received Logs record all successful and unsuccessful transmissions, along with time, date, and length of each transmission. A third log shows all files in the queue waiting to be sent. You can cursor to any log entry and view, print, or retransmit your selection.

A PLETHORA OF OPTIONS It's hard to think of transmission options that GammaLink has overlooked. This versatile product's capabilities include turnaround polling and transmission at a later time or date. The powerful script language is still there for automating complex procedures by means of batch files. The program can run in background mode, occupying a little under 200K of RAM (65K with the GammaFax CP). You can even send any sort of data file from one GammaFax board to another.

GammaFax had no trouble performing all our tests at 9,600 bps and turned in respectable performance times. It could even handle the 28-inch-long test page sent from our fax machine. The hard copy generated by GammaFax transmissions was generally of high quality. The graphics file transmitted to our fax machine produced an exceptionally clear, well-defined image mapped pixel to pixel, and text files were very readable. The printout of the PC-to-PC graphics file transmission wasn't as good, however.

The only problem we encountered was that when we transmitted an image scanned by the Hewlett-Packard ScanJet, it came out at double height. GammaLink told us that this was because of a bug in its driver for the ScanJet, which would be fixed in the next release.

On-screen display of faxed files is also good. You can zoom in or out on an image, scroll it, rotate it, or change it to black on white. There are no graphics editing capabilities, but you can extract part of a fax format file. You can also append a graphics file to an ASCII file by means of the rather cumbersome process of appending a command to the ASCII text with a word processor.

The GammaFax manual is for the most part clear and well illustrated. Unfortunately, all the documentation for the script

language is in the form of an apparently hastily assembled 150K disk file. GammaLink says it will revise this and put it on paper in a future release.

GammaFax's combination of power and flexibility with a simple, easy-to-use menu system should satisfy the needs of just about any user. It offers a high level of functionality at a reasonable price, proving that this fax board has finally come of age.—Robert Kendall

INTEL PCEO Connection CoProcessor

You always knew that Intel built solid, dependable hardware. But did you also know that the company designs equally dependable software? You'll see the result of that strong combination in the Connection CoProcessor, a \$995 fax system that helps define a standard of excellence for other systems to live up to.

As the name implies, the Connection CoProcessor includes an on-board microprocessor. While this feature is not unique, it is certainly a big plus. It allows true background operation, letting the full-length board go about its business while you go about yours. The Connection CoProcessor will occasionally steal time from a foreground application, but only when it needs to read from or write to disk.

The board itself is noteworthy for other reasons as well. Besides the usual modular

PC
magazine

**EDITOR'S
CHOICE**

FACT FILE

Connection CoProcessor
Intel PCEO
Mailstop CO3-07
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124-6497
(800) 538-3373
List Price: \$995
Requires: 640K RAM; IBM PC, XT, AT, PS 2 Model 30, and many compatibles, including Compaq; CGA, MCGA, EGA, VGA, or Hercules monochrome-compatible graphics card; DOS 3.0 or later.
In Short: While its list price makes the Connection CoProcessor one of the more expensive fax packages, the excellent error handling, intuitive menu structure, free technical support, and 5-year replacement warranty combine to make it a good choice. In addition, the inclusion of CAS support may turn out to be a valuable feature.

CIRCLE 403 ON READER SERVICE CARD

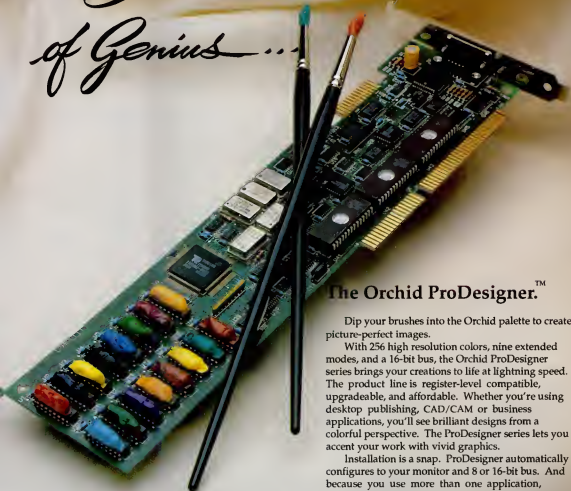
phone connectors, it sports a connector for the AppleTalk network. As of this writing, the connector is reserved for future use. According to Intel, the connector may disappear from future versions of the board, but it may also serve as a basis for an optional networking capability.

CAS SUPPORT Also remarkable is the fact that the Connection CoProcessor is the first piece of hardware to support CAS (also known as DICAS), the DCA/Intel



The first piece of hardware to support CAS (the DCA/Intel Communicating Applications Specification), the full-length \$995 Connection CoProcessor includes an on-board microprocessor that allows true background operation. Besides the usual modular phone connectors, this 9,600-bps board sports a connector for the AppleTalk network.

*a Stroke
of Genius...*



The Orchid ProDesigner.™

Dip your brushes into the Orchid palette to create picture-perfect images.

With 256 high resolution colors, nine extended modes, and a 16-bit bus, the Orchid ProDesigner series brings your creations to life at lightning speed. The product line is register-level compatible, upgradeable, and affordable. Whether you're using desktop publishing, CAD/CAM or business applications, you'll see brilliant designs from a colorful perspective. The ProDesigner series lets you accent your work with vivid graphics.

Installation is a snap. ProDesigner automatically configures to your monitor and 8 or 16-bit bus. And because you use more than one application, ProDesigner ingeniously selects the correct mode on its own. So you can concentrate on unleashing your genius into the creative world of Orchid graphics.

ProDesigner, Designer 800 and Orchid are trademarks of Orchid Technology. IBM, VGA, MCGA, EGA, CGA, and MDA are trademarks of International Business Machines. All other products are the trademarks of their respective manufacturers.

Features	ProDesigner VGA Plus	ProDesigner VGA	Designer 800 VGA
Bus & BIOS Support	16 and 8 Bit	16 and 8 Bit	8 Bit
Extended VGA Modes			
360x480 256 colors	Yes	Yes	Yes
640x350 256 colors	Yes	With User Upgrade	With User Upgrade
640x480 256 colors	Yes	With User Upgrade	With User Upgrade
800x600 16 colors*	Yes	Yes	Yes
800x600 256 colors*	Yes	With User Upgrade	With User Upgrade
1024x768 16 colors*	Yes	With User Upgrade	No
3 - 132 column 16 color modes	Yes	Yes	Yes
100% Register and BIOS Compatible with VGA, MCGA, EGA, CGA, MDA and Hercules	Yes	Yes	Yes
Auto Mode Switch, Auto R/16 Bus Sense and Auto Monitor Select	Yes	Yes	No
Suggested Retail Price	\$399	\$499	\$399

* Supports these standards on both interlaced (IBM RS/16 and compatibles) and non-interlaced (NEC Multisync XL and compatibles) monitors.

ORCHID TECHNOLOGY
45365 Northport Loop West
Fremont, CA 94538
Tel: (415) 683-0300

ORCHID (EUROPE) LTD.
Basingstoke, U.K.
Tel: +44 256-479898



CIRCLE 190 ON READER SERVICE CARD

■ FAX SYSTEMS

Communicating Applications Specification. In principle, CAS will let any software developer add background communications capability (including fax capability) to any application. A word processor, spreadsheet, or database program could pass information to the Connection CoProcessor or other CAS hardware for transmission as fax or data. (For more information on CAS, see the introduction that precedes these reviews.)

Given the promotion of CAS that accompanied the introduction of the Connection CoProcessor, and given a name that clearly reflects Intel's concentration on hardware, you might not expect much

■

***The Connection
CoProcessor
helps define a standard
of excellence
for other fax systems
to live up to.***

■

from the software side of this system. You'd be wrong: the software is as well designed as the hardware.

The software consists of two separate modules. A background module handles the actual communications. A foreground module takes charge of control functions, letting you designate such particulars as what faxes to send, when to send them, and to whom.

The background module is notable for its excellent error handling. For example, unlike most boards, the Connection CoProcessor breezes through one of the trickier PC Labs benchmark tests, which involves logging on to an empty drive while a fax is being transmitted. Its one failing was in letting the Ctrl-Alt-Del key combination reboot the computer in the middle of a fax transmission. I'd rather see the program trap the Ctrl-Alt-Del combination, warn that a fax transmission is in progress, and ask if you really want to reboot.

MENUS MAKE IT EASY Also on the plus side, the foreground module offers a remarkably easy-to-use menu system. For instance, to send a fax, you choose Fax, Send Fax, then change directories or select one or more files by highlighting each and hitting Return. Continuing with the menus, you select any combination of individuals and groups from your phone book, then choose time to send, resolution (standard or fine), text size (normal or compressed), and whether to send a cover page. As you finish each of these steps, the program automatically takes you to the next. And if any step is not immediately obvious, you can call up context-sensitive help for a detailed explanation. The foreground module also incorporates *PC Paintbrush* as its graphics editor.

You can use the fax modem for file transfer at 9,600 bps, but only if there's a Connection CoProcessor at the other end. Similarly, you'll also find an e-mail feature that works only with another Connection CoProcessor. The e-mail feature lets you create, edit, forward, send, and receive messages. This could be useful if, for example, your company standardizes on the Connection CoProcessor. As a bonus, you can use the text editor in the e-mail module to create documents to send as faxes.

As you might expect of an Intel product, the Connection CoProcessor supports LIM EMS 3.2 and 4.0. As tested without expanded memory, the software needs about 74K of conventional memory. According to Intel, it will use only about 6K with EMS.

WHAT'S MISSING? The only important feature missing from this package is the ability to capture screens or printer output from other applications. Apparently, Intel left out this capability on the grounds that other applications should supply it through CAS. Alas, that won't help much unless—or until—CAS is widely used.

Finally, there is the issue of cost. At \$995, the Connection CoProcessor is one of the more expensive fax packages, costing even more than some fax machines. (In part, the high price of the Connection CoProcessor is mitigated by the 5-year replacement warranty and the toll-free technical support that come with the board.)

And if you add an extra \$295 for an optional 2,400-bps modem, you wind up with even less of a bargain. Much of the Connection CoProcessor's value will depend on how widely CAS is accepted, an issue that is far from settled. Still, if you don't mind the price and judge strictly by quality, the Connection CoProcessor is a clear winner. —M. David Stone

MICROLINK INTERNATIONAL INC.

Microlink Fax LC96

Everything about Microlink's Fax LC96 is micro-sized: the short-slot board, the 60-page children's-book-sized manual, the inexpensive price tag, and, in keeping with the tradition, the product's list of features. If you're looking for an economical fax board that handles the basics without any of the frills, the \$499 Microlink Fax LC96 is a viable option. But there are a few limitations you should be aware of.

The best news is that your system will be up and running moments after you've opened the package. It's easy to install the board and configure it for a number of telephone installations (PBX, dedicated, and KSU Key Systems), requiring that you merely adjust a few jumper settings. The software includes an installation program



FACT FILE

Microlink Fax LC96

Microlink International Inc.

4064 McConnell Dr.

Burnaby, B.C.

Canada V5A 3A8

(604) 420-0366

List Price: \$499

Requires: 512K RAM (640K and hard disk recommended); CGA, EGA, or Hercules monochrome graphics card; DOS 2.1 or later

In Short: A micro-sized fax board with a micro-sized manual and price tag. If you stick to basic transmissions, this board will suffice. But if you want to send multiple messages, print multiple page documents, receive conversions with transmission, and edit graphics, you'll find that this board falls short of the mark.

CIRCLE 404 ON READER SERVICE CARD

Break through!

COREL OPTICAL DISKS for NOVELL LANs



COREL announces the finest in data security and mass storage for Novell Networks.

As the world's leading developer of WORM (Write Once Read Many) interface software for IBM and Apple Mac computers, COREL brings its record of software excellence to the network environment.

Now, Novell Netware 2.15 has a new storage solution breakthrough. COREL optical disk subsystems provide the ultimate back-up and highest security options available.

Operating on the network file server, COREL's optical software supports elevator seeking, directory hashing, and directory caching. Complete access

across Network Bridges let you support and run even your largest applications. No extra hard disk space or workstation memory is required.

Optical storage gives you the potential for infinite capacity since removable optical cartridges are used. And security is insured with the write-once character of the technology. You'll never worry about losing data again.

COREL software is completely compatible with Novell Netware utilities, security levels, and all existing applications. The world's leading developer of WORM interface software invites you to make the networking breakthrough. For details, contact COREL Systems today!

CIRCLE 376 ON READER SERVICE CARD



COREL

■ FAX SYSTEMS



Microlink's \$499 Fax LC96 is an economical short-slot 9,600-bps board that handles the basics without any frills. It's easy to install and configure for various telephone installations, requiring you merely to adjust a few jumper settings.

that configures your equipment and will even modify your AUTOEXEC.BAT file to run the program in the background if you prefer. (Unfortunately, there is no way to remove the resident portion of the program without rebooting the machine.)

The Fax LC96 software relies on a series of easy-to-use pop-up menus. You activate menu choices by pressing function keys. The menus allow you to handle most varieties of send (with/without dial, delay time, select phone number from directory, and so on) and receive (auto or manual). A pop-up country and city code finder is a helpful utility.

The program supports a good number of file format conversions: ASCII, *Dr. Halo*, TIFF, *PC Paintbrush*, and *Windows Paint*. However, you'll have to convert the files in a separate step prior to transmission. There are no facilities to do this as you transmit or to convert from a fax format to another format. Microlink says it plans to include a fax-to-*PC Paintbrush* conversion facility shortly. Since there's no way to pop up a listing of files from the conversion menus, you'll need to rely on memory or make a trip back to DOS to hunt down your filename.

PSEUDO-FEEDBACK The software offers very little feedback while it is engaged in transmission. What you often get

is a kind of pseudo-feedback: you get the appearance of feedback when in fact things are really going awry. For example, during transmission a pop-up box with the word Transmitting appears the instant that you specify the Dial command. The box is supposed to remain on-screen until the process is complete. But at certain times the "transmitting" message remained in place even when the process had failed. Packages that display status information messages (waiting for ring, dialing, 50 percent done, and so forth) are considerably more helpful. On the other hand, the program does make sure that an error condition is properly flagged in the activity log.

The program reacts similarly during printing: a pop-up box that says "processing data" appears on-screen even when the printer is working correctly. Finally, the program could not transmit our 28-inch paper; it's limited to a slightly larger than legal-sized format.

Microlink offers few accessory facilities. There is no text editor and no way to attach signature and letterhead files. You are permitted to view a graphics file on-screen, but the FAX LC96 software lacks facilities for editing the file. There is no control over fine (as opposed to normal) resolution, nor are there any gray-scale capabilities. However, the system transmitted all text and graphics in the proper as-

pect ratio. Fonts have no support either, although the program can handle the ASCII extended character set. In addition, there are some undocumented commands, such as one that moves you to the next page in the viewer.

Certain enhancements to the send menu are helpful, but not enough to satisfy the needs of frequent fax users. There are no facilities for polling. While you can easily send a delayed fax transmission or broadcast a single message to a group of recipients via a phone directory, the program lacks any facility for creating a distribution list to transmit multiple messages—unless you name each message identically and give them consecutively numbered extensions. Furthermore, although the package stores consecutive pages as FAX01.301 and FAX01.302, you cannot print multiple-page documents without specifying each page as a separate file.

In the list of the Fax LC96's omissions, there is a curious inclusion. The Fax LC96 can send binary files via a 9,600 bit-per-second high-speed file transfer. When the manufacturer wanted to send me a bit of additional software code, this feature was a helpful addition. However, you can transfer files only to another Fax LC96 or other Microlink fax board. A micro problem?—Robin Raskin

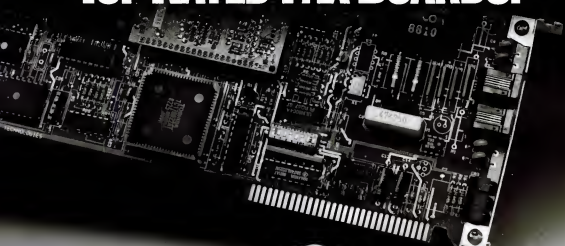
OMNIUM CORP.

Omnium PC Fax System

Does your pioneer spirit rebel against the slick sophistication of most recent fax products? Do you feel an uncontrollable urge to roll up your flannel sleeves, stomp into the wilderness, and dig down to the frontier roots of the fax phenomenon? If so, Omnium Corp.'s \$599 Omnium PC Fax System is the board you've been itching for.

Minnesota-based Omnium Corp. doesn't make boards for city slickers who can't imagine living without hot-and-cold running water. City slickers expect their fax software to take ASCII files found anywhere on their disk and convert them automatically into fax format while transmitting them. Omnium's software can locate only files stored in the fax directory, and it makes you convert ASCII files before you can transmit them. To add to the frontier

YOU'VE JUST READ THAT FAX-MAIL 96 IS ONE OF THE TOP RATED FAX BOARDS.



~~\$599~~
\$499

WE'VE JUST MADE IT 100 TIMES BETTER.

Order now and receive the
fastest, fully featured fax
board available, now for a
limited time only \$499.

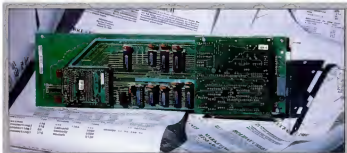
Call 1-617-235-3026. Offer expires May 31, 1989.



**Brooktrout Technology
Incorporated**

110 Cedar Street
Wellesley Hills, MA 02181
Telephone 617-235-3026
Fax 617-235-0310

■ FAX SYSTEMS



The only board tested that transmits at the leisurely pace of 4,800 bps, Omnium Corp.'s \$599 Omnium PC Fax System shows good workmanship and an uncrowded layout. One oddity, however, is a small transformer that pokes through a hole in the back of the board and may interfere with an adjacent card.

challenge, Omnium insists on converting a multipage ASCII file into a group of separate files, one per page. Any incoming multipage file gets the same treatment and is converted into multiple files that you have to read or print separately.

CITY FAX, COUNTRY FAX City slickers expect fax software to report the length of each transmission in the log file and to present error messages in clear English. Omnium makes you get out the calculator to figure out the length of any call and presents errors in the form "ERRFLG = 35". If you want to know what the number means, get on the phone to Omnium, and don't waste time looking for explanations in the manual. Whenever the Omnium board sends or receives a file, it displays the hex codes of the first few seconds of data. Real men understand sequences like "B3 A0 A4 B2 09 B4 60" when they see them.

City slickers expect their fax software to receive files in the background while they get other work done. Omnium's foreground-only software takes over your computer whenever you send or receive. City slickers expect their fax software to control a scanner. Omnium expects you to use the scanner manufacturer's software to create .PCX or .Dr. Halo files, and then use Omnium's software to convert them into fax format.

City slickers expect their fax boards to have both a line jack and a phone jack. Omnium gives you one jack only—al-

though it throws in a plastic Y-connector that you can use to plug in a phone.

LIFE IN THE SLOW LANE Frontier folks don't suffer from the same frantic time pressures as city slickers, so they won't mind waiting 30 seconds while Omnium's software converts a 1¼-page ASCII file into two fax files, and then another 2½ minutes while Omnium's hardware transmits the two files at the leisurely pace of 4,800 bits per second. Frontier typography has never been known for elegance, and Omnium maintains the tradition by using a nearly unreadable font with some letters too thick or too thin, and with the numeral 2 almost indistinguishable from a capital Z.

Omnium doesn't intimidate you with a slick manual or software. As documentation, you get 40 spiral-bound pages, some of them pasted over with foldout updates. And you won't find the manufacturer's address or phone number anywhere in the manual.

The software doesn't let you do anything as simple as press Enter to confirm your choices. Instead, you have to keep pressing F10 as a confirm key when you think you've already told the software everything it needs to know.

When you want to do anything with your fax files, Omnium doesn't even automatically give you a menu of available files. To view a fax, for example, you press V at the main menu to get to the View menu, press F2 to see the list of files (each



FACT FILE

Omnium PC Fax System

Omnium Corp.

1911 Curve Crest Blvd.

Stillwater, MN 55082

(P.O. Box 186)

(800) 328-0223

List Price: \$599

Requires: 256K RAM; CGA, EGA, VGA, Hercules monochrome graphics card; DOS 3.0 or later.

In Short: Omnium's foreground-only software has limited capabilities, an unappealing font, and no scanner control. Multipage documents are sent and received as multiple files.

CIRCLE 406 ON READER SERVICE CARD

file containing a single page), move the cursor to the one you want, then press Enter to move it into the filename field. Since you can choose only one file at a time, this should be enough to get you started—but now you have to press F10 to start the viewer.

After a fairly long wait, you can see the chosen page in white on black. Although most of Omnium's software is menu driven, nothing on the screen even reminds you that to change the scale of the viewed image, you have to press Z and then a number from 1 to 4. You can't change the default scale, which produces an easily readable image with a Hercules card, and a less readable one with an EGA. You have to go through the View-F2-Enter-F10 procedure with every page in a multipage file.

At least the print menu lets you list a series of incoming pages before printing them to an Epson- or HP-compatible printer. But if you want to send a multipage file to more than one destination, you have to prepare a separate list of each destination for each page of the file.

One of the two Omnium boards tested in PC Labs was unable to receive data from the other without timing errors that invariably caused it to break off the transmission. Omnium first traced the problem to the fact that its software is optimized for 256K machines and PC Labs had 640K. But when the other board performed well in the same machine, Omnium's tech support was unable to offer an explanation.

A Brand New Resolution The Handy Scanner HS-3000



Desktop publishing has never been easier!

With DFI's new HANDY SCANNER (HS-3000), scanning BIG pictures has become a breeze.

The HS-3000 is the first hand-held scanner to offer four (400/300/200/100) DPI resolutions for the IBM PC/XT/AT, PS/2 Models 25/30 and their compatibles. Able to scan an image 4-1/8" wide, it also has some unique features such as: 32 levels of grey resolution (others only have 16 levels), a fast 7-sec. scanning speed (for 10" at 300 DPI) and a yellow-green light which captures the reddish skin tones of your images (scanners with red lights just can't see the all-important skin tones), thereby giving you sharper pictures. What's more, a real-time screen display lets you instantly



see your scanned image, so you can quickly make the necessary adjustments, if needed.

With its accompanying software, you can quickly scan, bit-edit, crop, save and use the images under graphics packages such as PageMaker, Ventura, WordPerfect 5.0, PC Paintbrush+, and many others.

You can scan dot matrix, typewriter and laser printer monospaced texts and use them in your word processor. The trainable OCR software has the exclusive ZIP feature which lets you merge 2 scanned pages into one.

The HS-3000 package includes the scanner, interface card, a utility disk, an instruction manual and the HALO DPE graphics editor/layout program.

The HANDY SCANNER 3000 — a truly remarkable package, as only DFI can deliver.

DFI®

DIAMOND FLOWER ELECTRIC INSTRUMENT CO., [U.S.A.] INC.

2544 Port St., West Sacramento, CA 95691 Tel: (916)373-1234 Fax: (916)373-0221

DIAMOND FLOWER ELECTRIC (NORTHEAST), INC.

5C Joanna Court, East Brunswick, NJ 08816 Tel: (201)390-2815 Fax: (201)390-2817

CIRCLE 742 ON READER SERVICE CARD

■ FAX SYSTEMS

A FEW CONVENIENCES The frontier spirit of the Omnium system allows for a few conveniences. Installation is simple. You can pop up an editor screen and write a message that the program will convert directly to fax format and send. The editor doesn't have word wrap, so you have to press Enter at the end of every line and you can't type more than one screen, but for a quick message it's enough.

Omnium's full-length board shows good workmanship and an uncrowded layout. One oddity is a small transformer that pokes through a hole in the back of the board and may interfere with an adjacent card.

The Omnium PC Fax System works happily with a two-floppy system, and its software is designed to work with 256K of RAM. If you're using this kind of log-cabin system, the Omnium board will fit right in.—Edward Mendelson

PAMIRS BUSINESS INTERNATIONAL CORP.

Pamirs FA10

You're asleep at home and your colleague from across the country wants to fax something to you immediately. Ordinarily, you'd have to leave your computer running with the fax software loaded. Not with the Pamirs FA10. This 3/4-length fax board has an Auto-on option that can sense an incoming fax transmission and then power up your computer system, after



For \$30 above its list price of \$565, you can purchase the 3/4-length 9,600-bps Pamirs FA10 with an Auto-on option, which can sense an incoming fax transmission when your computer is turned off, then power up your system. Once the computer is running, the software takes over and receives the fax.

which software takes over and receives the fax. And just so your system doesn't stay on all night, the Auto-on option shuts your system down when it has finished receiving the fax.

The Pamirs FA10 used to come standard with the Auto-on feature and cost \$795. Last December the vendor lowered the price and unbundled that feature from the board. Now you can buy the fax board and software for \$565, or \$595 with the Auto-on feature. The \$30 price differential makes it worth purchasing this option even if you'll use it only infrequently. (The Pamirs system isn't the only one with an automatic power-up option; American Data Technology's SMARTFAXplus has one too, but its feature costs \$299 over the price of the board.)

EDIT AND COMMAND MODES In most other respects, the Pamirs FA10 is a fairly straightforward 9,600-bit-per-second PC fax system. The FA10 includes a minimal editor that lets you write and edit short documents, as well as draw lines and boxes. You can also use the editor to create listings for mass faxing.

The Edit mode is one of the FA10's two opening modes. The other is the Command mode. You'll spend most of your time in the Command mode, which lets you control the system's operations via the function keys; these are displayed in a horizontal bar menu at the bottom of the

screen. Each of the major operational areas has its own "subfunction" menu.

The Pamirs FA10 software operates as a standalone program or as a TSR. When sending or receiving, it comes into the foreground and controls the computer for the duration of the fax transmission or reception. You can turn reception off if you don't want to be interrupted for a time.

The FA10's use of system memory helped it pass our error handling tests with flying colors. The only interruption of a receiving fax occurred when we rebooted the receiving computer, and even then the transmitting computer just rescheduled the fax for later transmission. Putting the receiving machine in situations that frustrated lesser systems, such as reading an empty floppy disk drive or pausing a screen, didn't faze the FA10 at all.

BEYOND FAX MACHINES The FA10 has a reasonable selection of features not found in regular fax machines, though the list is not as extensive as that of some of its competitors. For example, you can use calling groups for distributed faxing, and you also can view and print a transaction log. You cannot, however, capture a screen or capture output formatted for a printer, either for immediate or subsequent transmission. Both normal and high-resolution modes are available, as are normal and compressed fonts. The FA10 will support gray-scale images from a scanner, but



FACT FILE

Pamirs FA10

Pamirs Business International Corp.
550 Lake Site Drive, #2
Sunnyvale, CA 94086
(408) 736-2583

List Price: \$565 without Auto-on option
(\$595 with Auto-on option)

Requires: 384K RAM (hard disk recommended); CGA, EGA, or Hercules graphics card; DOS 2.0 or later.

In Short: It may lack some of the fancy features of other fax systems, but the Pamirs FA10 is an adequate performer. It can set up 20 different groups of up to 800 numbers each for mass broadcasting of faxes. Software includes a functional word processor.

CIRCLE 69 ON READER SERVICE CARD

Publish-It! in less than an hour.

PUBLISH IT!—A full-featured, fully integrated desktop publishing powerhouse with word processing, page layout, typesetting and graphics.

Even if you have no design skills or publishing experience, you can get results in less than an hour with PUBLISH IT!

For all its state-of-the-art ability, PUBLISH IT! is incredibly easy to learn—refreshingly so. PUBLISH IT! combines the familiar GEM User Interface, our Quick-Start Mini-Manual, a full complement of Help Screens, and the practical **WYSIWYG (What-You-See-Is-What-You-Get)** display—all designed to get you up and running in less than one hour!

SPECIAL FEATURES:

- **GEM User Interface:** It's fast and easy. Pull-down menus, icons, scroll bars and dialogue boxes help you learn and use the program quickly. Your display screen shows you exactly what your final product will look like when you print—**What-You-See-Is-What-You-Get**.
- **Flexible Page Layout:** With your mouse or joystick, and keyboard, you can overlap, reposition, resize, & reshape the text, columns, graphics. Change your layout or experiment almost effortlessly!
- **Built-in Fonts:** Choose from over 1200 possible type-style combinations! Opt for bold, italic, underlined, white, light, & superscript or subscript characters. Type sizes range from 7 to 72 point.
- **Premium Quality Printouts:** PUBLISH IT! uses a special high density printout format that gives you superior quality printouts on your dot matrix printer.
- **Built-in Word Processor:** All the features necessary for everyday word processing, plus most of the sophisticated ones found only in more expensive programs.
- **Text Importing:** Load documents from WORD PERFECT, MICRO-SOFT WORD, WORDSTAR, WORD WRITER PC, or from any other program with an ASCII text format directly into PUBLISH IT!*
- **Built-in Graphic Toolbox:** Draw lines, boxes, circles, curved corners, and "free-hand" graphics. Plus, choose from a wide variety of built-in line and fill patterns.
- **Kerning and Leading**

- **Graphics Importing:** Directly import graphics from LOTUS 1-2-3, GEM DRAW, GEM GRAPH, GEM SCAN, PC PAINT-BRUSH, and PUBLISHERS PAINTBRUSH.* Then crop and size them to fit.
- **Automatic Text Flow and Word Wrap:** Flows text from around graphics; and from column to column on the same page, or carries it over to subsequent pages.
- **Multiple Size Page Views:** View, edit and layout pages at actual, double or half-size.
- **Over 150 Professionally Drawn Graphics & Illustrations.**
- **Plus, you get worksheets, time-saving features, sample documents & more!**

Includes 5¼" & 3½" disks; supports hard drive.

Suggested Retail Price **\$199.95**

(Also available for Apple IIe, IIc, IIgs Computers . . . **\$129.95**)

At your local dealer or order direct from Timeworks:

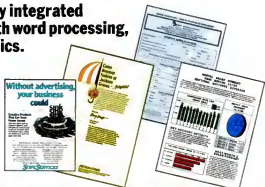
1-312-948-9202.

**TIMEWORKS
PLATINUM**

444 Lake Cook Rd., Deerfield, IL 60015
312-948-9200

DOCUMENTS DO NOT PRINT OUT IN COLOR
*Registered trademarks of their respective companies.
©1987 Timeworks, Inc. All Rights Reserved.

With Timeworks You Get:
• A Money Back Guarantee
• Free Customer Technical Support



TIMEWORKS ACCESSORY PACKS

give you hundreds of new ways to add impact to your PUBLISH IT! documents.

- **People, Places & Things:** Over 240 ready-to-use graphics & illustrations.
- **Symbols & Slogans:** Over 400 graphics, borders, logos, & more.
- **Education Graphics:** Over 250 camera-ready school graphics.
- **Design Ideas:** Over 85 layout ideas for ads, newsletters, brochures & more.
- **Font Pack 1:** Includes 8 unique typefaces, 7 special effects, in sizes 9 to 72 point.
- **Font Pack 2:** 8 more typefaces, with 7 special effects, in sizes 9 to 72 point.

\$39.95 each



FAX SYSTEMS

has no specific gray-scale support or enhancement of its own. As a result, the system produced a pretty good replica of our test photo and color wheel, but the results were not as good as those produced by units with specific gray-scale support.

The most recent version of the Pamirs FA10 converts from *PC Paintbrush*, *Dr. Halo*, *Windows Paint*, and ASCII format files, as well as Pamirs's proprietary .IMG file format. The vendor plans to support conversion in the other direction, but there is none so far.

The FA10 works well with fax machines and even has a plug for a "local" fax to use a fax machine as a scanner. Pamirs supports the Canon IX-8 and IX-12, HP ScanJet, Microtek MS-200C and MS-300C, Telescan, and Digitech hand-held scanners. It also works with many printers, including the HP LaserJet, but it does not work with PostScript printers.

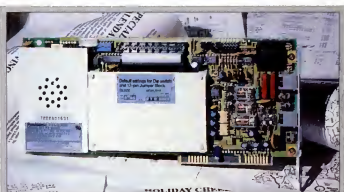
When the FA10 transmits to another FA10 unit, it recognizes its sibling and speeds up considerably. Of course, you still have to print the received file to get hard copy, and the Pamirs takes a good while at this task. In general, though, this is a speedy system—at least until printing time.

The Pamirs FA10 is a solid performer with some special features. According to the vendor, future versions of the software will include many of the currently missing features, such as screen and printer capture. For now, however, the system works well, and at just \$565—or \$595 with Auto-on—it's a good deal. —Bruce Brown

PANASONIC CORP.

Panasonic FX-BM89+ Fax Partner

Panasonic keeps adding conveniences to its already impressive fax board, the \$999 FX-BM89+ Fax Partner. This is essentially the same board that received a warm welcome to the fax scene in *PC Magazine's* first roundup (June 28, 1988). It is graced with mostly intuitive menu-driven software that runs in background and TSR modes and supports polling of remote systems. But the plus sign recently added to the ungainly name of this 3/4-length board signifies some important improvements.



The plus sign added to the ungainly name of Panasonic's \$999 FX-BM89+ Fax Partner signifies some important improvements, among them the fact that you don't need to take the extra step of creating ASCII files in your word processor whenever you want to transmit text via this 3/4-length 9,600-bps fax board.

With Panasonic's latest software, for example, you don't need to take the annoying extra step of creating ASCII files in your word processor whenever you want to transmit text via the fax board. You tell the installation program which of ten popular word processors you use, and the software automatically converts the word processor's files into fax format when transmitting. Also, you can now transmit directly from a scanner—even a scanner with a multipage feeder—without going through any intermediate file-saving steps. Further improvements, especially in Panasonic's slightly rough-edged graphics and viewing functions, are due in a new version of the software, which should be available by the time you read this review.

CABLE NOT INCLUDED Panasonic's Fax Partner is a well-constructed 3/4-length board with separate jacks for the line and the phone, a built-in speaker, and a small external box with two LEDs that signal when the board is sending or receiving. The one item absent from the package is a standard cable to connect the board to the phone jack in the wall. If you don't have a spare cable, don't try to install this board when the local hardware store is closed, or you'll be very frustrated.

When you go to the hardware store for the cable, also pick up a small screwdriver



FACT FILE

Panasonic FX-BM89+ Fax Partner

Panasonic Corp.
Panasonic Industrial Co.
2 Panasonic Way
Secaucus, NJ 07094
(201) 348-7000
List Price: \$999

Requires: 640K RAM; minimum 10MB hard disk; CGA, EGA, VGA, or Hercules graphics card; 8-bit expansion slot; DOS 3.1 or later.

In Short: Straightforward to install, the FX-BM89+ offers intuitive software with some awkwardness in the viewer and graphics editor. Efficient memory-resident scheduling and powerful scanner control make this a board worth considering.

CIRCLE 407 ON READER SERVICE CARD

to pry off the magnet that Panasonic uses for mounting the external LED box to your computer. Cheap magnets and valuable data don't belong in the same room. I had no trouble destroying a floppy with Panasonic's magnet. If you have a Panasonic computer, get the FX-BM88 model instead, with an LED box that replaces the LED box on the front of the machine and doesn't use a magnet.

The Fax Partner lets you print your incoming faxes to just about any standard dot

How to make \$1,000,000 look like a million bucks.

Introducing Allways. For 1-2-3 printouts that are worth more than a second glance.

Now you can turn even ordinary 1-2-3* spreadsheets into valuable business assets. Just print them with Allways.

It's the new 1-2-3 add-in designed to make every worksheet you print look crisper, more credible, more presentable than ever before. And it works directly from 1-2-3. With menus and commands that look and feel just like 1-2-3 itself.

We call it "The Spreadsheet Publisher."

That's because Allways gives you such an astonishing range of formatting and printing options. And its "what-you-see-is-what-you-get" display eliminates all the guesswork.

Use up to 8 typefonts on any printout—apply them cell by cell, or throughout ranges.

Add emphasis with bold or underline. Incorporate 1-2-3 graphs. Highlight important information with light or dark shade. Add drama with solid black. Set off data with vertical or horizontal lines, or enclose it in boxes. And for the bottom line, double-underline.

Plus, you get full support for your laser printer and dot matrix printer—using its internal fonts, as well as the fonts that come with Allways. With an HP* LaserJet* Plus or Series II, you can also use font cartridges and a full complement of downloadable fonts in sizes from 5 to 24 point.

Best of all, Allways runs right inside 1-2-3. So you can go on creating your spreadsheets in 1-2-3 as always. Then pop into Allways to make them look great.

Start showing the true value of your 1-2-3 spreadsheets. Print them with Allways. It's just \$149.95 at software dealers everywhere. Or direct from Funk Software with your check, Visa or MasterCard.

**FUNK
SOFTWARE
WARE**



1. Create your worksheet in 1-2-3 as always

2. Pop onto Allways to make it look great

3. What you see in Allways is what you get on paper

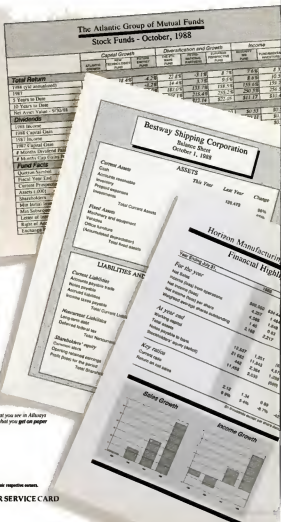
Allways
The spreadsheet publisher

To order call 1-800-822-3865 Ext. 115 (802-497-6339 in MA)

Funk Software, Inc., 222 Third Street, Cambridge, MA 02142

© 1989 Funk Software, Inc. Allways and Allways The Spreadsheet Publisher are trademarks of Funk Software, Inc. 1-2-3 and HP LaserJet are trademarks of their respective owners.

CIRCLE 237 ON READER SERVICE CARD



■ FAX SYSTEMS

matrix or laser printer, and you can use the accompanying fax software to drive scanners made by Panasonic, Canon, Microtek, or HP. You choose files to send from a point-and-shoot menu that can present any directory on any drive. The software automatically converts ASCII files, *PC Paintbrush* .PCX files, and scanned .DCX files, as well as files from your selected word processor.

The installation program lets you specify a header for each page or a lead file that precedes every transmission, or both. You

■

***The Fax Partner
wasn't fazed by any
of the error
conditions thrown at
it during our tests.***

■

can easily create distribution lists and lists of numbers to poll for remote transmissions. Scheduling for later dates and times is easily arranged and just as easily rearranged if you change your mind.

BACKGROUND OPERATIONS Once you schedule your transmissions and set the software to receive automatically, you can return to your other applications and let the 16K resident scheduler lurk in the background. The TSR software won't let you reboot during a transmission, and it wasn't fazed by any of the error conditions thrown at it by the PC Labs performance tests. You can set up the software to print all incoming faxes automatically, but the program can do this only while you run it in the foreground.

The built-in fax viewer, a modified subset of ZSoft's *PC Paintbrush*, is slower than it ought to be and uses a completely different menu structure from that of the main software. You'll need a mouse if you don't want to waste your time using the arrow keys to push the pointer across the menu a millimeter at a time. The viewer includes an option to print a fax to high-

resolution mode. You should use it if you want decent printouts, because the low-resolution mode available from the fax-printing menu in the main part of the software tends to give grainy or washed-out graphics images, although text is perfectly readable.

When converting text files to fax mode, Panasonic uses a clumsy sans serif font. Its defects are partly balanced by the availability of a compressed font that can be used for spreadsheets or any text up to 132 columns wide. And when you send text or graphics from a scanner through the Fax Partner to a remote fax machine, the results are extremely impressive. PC Labs' test photo and color wheel were reproduced at the remote fax with perhaps the best possible detail available from 200-dot-per-inch resolution of the Group 3 fax standard.

One of the choices on the software's Utility menu is a graphics editor that turns out to be ZSoft's *PC Paintbrush*. This is a powerful program that isn't fully integrated into the rest of the software, and many of its functions, such as flipping and inverting areas of the image, would be more useful in the viewer.

Panasonic's board is a combination of minor quirks and major strengths. It's a superb product for sending faxes, and only its awkward graphics functions keep it from being a superb product for receiving. —Edward Mendelson

QUADRAM LIMITED PARTNERSHIP

JT-Fax 9600

When *PC Magazine* reviewed PC fax boards in the June 28, 1988, issue, Quadram's \$395 JT-Fax was a favorite because of its price, features, and intelligent menu structure. It also stood out as a finished product in a field that might have been described as not quite ready for prime time. Quadram still sells the board, which was a bargain then and still is. But with its newest offering, the \$795 JT-Fax 9600, the vendor has addressed the original product's drawbacks: its limitation to 4,800-bit-per-second operation and a TSR feature that popped up in the middle of other applications when receiving or sending faxes.

With a price more than double that of the JT-Fax, the JT-Fax 9600 is still a good deal. The maximum transmission speed, as indicated by its name, is 9,600 bps. Background operation in this version also stays in the background where it belongs. The JT-Fax 9600 retains the intuitive menu structure of the original product, and its impressive list of extra features, if not enlarged noticeably, is still one of the fullest available.

The JT-Fax 9600 board itself is a 3½-length card that plugs into any 8- or 16-bit slot. Memory address and interrupt settings reside on the card, but all other configurations and features are controlled by software. The configuration program is easy to use, which helps because to name a new calling group (a list of numbers to call in a batch), you'll have to run it again—a minor inconvenience.

STANDALONE OR RAM RESIDENT

You can run the JT-Fax 9600 software as a standalone program, a good idea if you don't send or receive many faxes. Why tie up any memory at all or have any slowdown in disk access or CPU speed? In most common operation, however, the JT-Fax 9600 software is run as a RAM-resident program that checks periodically for incoming faxes, which it will then automatically save. You can set it to print all incoming faxes that are received during the



EDITOR'S CHOICE

FACT FILE

JT-Fax 9600
Quadram Limited Partnership
1 Quad Way
Norcross, GA 30093
(800) 548-3420
List Price: \$795

Requires: 640K RAM (hard disk recommended); IBM PC, XT, AT, PS/2 Model 25 or 30, compatible; CGA, EGA, VGA, or Hercules graphics card; DOS 2.0 or later.

In Short: The JT-Fax 9600 improves on the popular JT-Fax with an increased 9,600-bps maximum transmission speed and true background operation. Its software, which can run as a standalone program or a TSR, features an intuitive menu system and includes such extras as screen capture, printer capture, and calling group utilities.

CIRCLE 404 ON READER SERVICE CARD



"The Datworld 286 [12MHz] AT compatible... [is]... the fastest machine of the nine tested in that review [July 1988]."

... speed and excellent compatibility... hundreds of dollars less expensive than other AT compatible.



EDITOR'S CHOICE

NOW!
20MHz 286
SI = 22.5

"Marvelously cheap, powerful alternative... outperformed the other 286's..."

(October 11, 1988)



DATA-286 12MHz

80286 running at 8/12MHz, 0/1 wait state
Phoenix BIOS std. (Award BIOS opt.)
512KB of RAM, expandable to 1MB on board
Socket for 80287-8, -10
200W power supply
Real-time clock with battery backup
1.2MB floppy disk drive
Floppy/hard disk controller
(1:1 interleave controllers available)
101-key keyboard with "click"
Mono card w/parallel port (720x348)
TTL monitor with tilt/swivel base

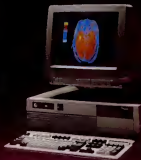
\$1195



Portacomp II

80286 running at 8/12MHz, 0/1 wait state
Phoenix BIOS std. (Award BIOS opt.)
512KB of RAM, expandable to 1MB on board
Socket for 80287-8, -10
Real-time clock with battery backup
1.44MB 3.5" floppy disk drive
20MB, 39ms, self-parking hard drive
102-key keyboard with "click"
Super twist backlit LCD, 640x400 res.
RGB/monochrome output port
Weights under 20 lbs.
1.2MB external floppy drive opt.
Carrying case available

\$1975



DATA-286 20MHz

80286 running at 10/20MHz
AWARD BIOS std.
1MB of RAM, exp. to 2MB on board
EMS 4.0 support for memory over 1MB
Socket for 80287
200W power supply
Real-time clock with battery backup
1.2MB floppy disk drive
1:1 interleave floppy/hard disk controller
101-key keyboard with "click"
Mono card w/parallel port (720x348)
TTL monitor with tilt/swivel base

\$1555

COMPLETE 10MHz DESKTOP SYSTEMS FROM \$945.00



Vertical Case

Front panel on/off switch
220W power supply
6 half-height drive bays
Dimensions: 16 3/4"(D) x
7 3/8"(W) x 25 5/8"(H)
Available for 286-386 models



DATA-386

4.77/6/16MHz (20MHz opt.)
1MB of RAM, exp. to 10MB
Phoenix BIOS std. (Award opt.)
220W power supply
1.2MB floppy disk drive
Floppy/hard disk controller
101-key keyboard with "click"
Five 16 and two 8-bit slots
Mono card and monitor **\$1995**



Portacomp I

80286 8/12MHz, 0/1 wait
Phoenix BIOS std. (Award opt.)
512K RAM (exp. to 1MB)
200W power supply
1.2MB 5.25" floppy drive
20MB hard disk drive
Super twist backlit LCD
RGB output port
5 expansion slots
1 parallel, 2 serial ports **\$1875**



Dataworld Keyboard

101-key enhanced layout
L-shaped large return key
Integrated dust cover (paper rest)

\$89



Color-coded key set for
WordPerfect available

Prices subject to change. No charge for credit card, check, C.O.D. 30 day moneyback guarantee (Shipping charges non-refundable).

Dept. C

Dealer/overseas inquiries welcome

In-Calif. 1-800-722-7734 INFO: (213) 695-3777

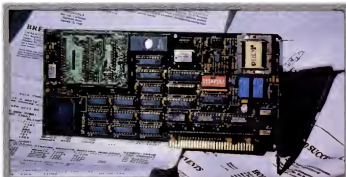
Out-Calif. 1-800-722-7702 TECH: (213) 699-8250

Monday Through Friday, 7 A.M. to 6 P.M. Saturday 9 A.M. to 3 P.M. PST.

3733 San Gabriel River Parkway, Pico Rivera, CA 90660-1495

A PREFERRED COMPUTER SYSTEM
DATAWORLD

■ FAX SYSTEMS



With the \$795 JT-Fax 9600, Quadram has addressed the drawbacks of its original JT-Fax board: its limitation to 4,800-bps operation and a TSR feature that popped up in the middle of other applications when receiving or sending faxes. The software that accompanies the 1/2-length card still retains the intuitive menu structure of the original product.

night, for example, so you don't have to wait to print them or view them on-screen the next morning.

While you are using other software with the JT-Fax 9600 software resident, other applications will slow down only while you are sending or receiving faxes. Unlike its slower, less expensive sibling, the JT-Fax 9600 does not make you stop all other operations while it receives or transmits.

AS EASY AS IT GETS You control all operations through simple menus. I've seen several people walk up to a computer with the JT-Fax software running and successfully send a fax from a stored file without having to look at the documentation or ask a question. You can't get much easier than that. New utility programs also let you transmit, print, and display faxes directly from the DOS command prompt.

You can save fax numbers in a telephone directory and also assign them to one or more calling groups for mass transmission. You can also chain files for inclusion in a single fax. You can either transmit faxes immediately or schedule transmission for a later time. In addition, you can print a transaction log of transmitted and received faxes and failed attempts.

The JT-Fax's normal method of operation is to convert scanned input or disk files to fax format at the same time as transmis-

sion, although you can opt to preconvert files. While doing the latter slows down the transmission process, it also saves considerable disk storage space.

Besides standard fax operations, the JT-Fax 9600 has a screen-capture facility and a printer-capture feature that lets you fax text files formatted for an Epson FX-80 or compatible printer. You can insert signature, letterhead, or text files in faxes and can send and receive PC PaintBrush files directly. When you buy a JT-Fax 9600, you get a \$40 coupon for Inset Systems' \$99 program *HiJaak*, which includes a JT-Fax conversion utility to let you use graphics and other files from a wide variety of programs. This is just one of several programs coming from other vendors that aid the use of JT-Fax products with various application packages. Quadram's Asher Fax Division is aggressively working with other vendors to establish the JT-Fax line as an industry standard.

PEACEFUL COEXISTENCE JT-Fax boards work with all Group 3 fax machines, and Quadram reports that earlier problems with idiosyncratic fax machines have been cleared up. The Asher Fax Division also maintains a bulletin board from which registered users can download the latest copy of JT-Fax software.

The JT-Fax boards support a wide variety of scanners and printers—among them

scanners from Brother, Princeton Graphics Systems, Hewlett-Packard, Canon, and Chinon; and printers from Brother, Epson, Genicom, IBM, and Hewlett-Packard. Our printed test samples looked very good, both in normal- and high-resolution modes. The board handled the oversized 28-inch test sample with ease, and the gray scale of the scanned image also looked pleasing.

If you don't need the extra speed and don't mind halting other computer applications when you send or receive a fax, the \$395 4,800-bps JT-Fax internal version (\$495 for the external version) may be all you need at less than half the price of the JT-Fax 9600. But if you need speed and want background operation, the JT-Fax 9600 is the one to look at.—Bruce Brown

RICOH CORP.

ImageCard

If anyone knows how to build a fax board, it ought to be Ricoh. As one of the leaders in fax machines, Ricoh has a wealth of experience to draw on. And, indeed, the \$1,175 ImageCard hardware is just as good (and as expensive) as you would expect.

The full-length ImageCard board sports a microprocessor to handle background operations and a proprietary chip that decompresses each line of a received fax, looks at the error code, and recompresses it before saving the data to disk. This results



FACT FILE

ImageCard

Ricoh Corp.
5 Dedrick Pl.
West Caldwell, NJ 07006
(201) 882-2000

List Price: \$1,175 (to change); *ImageNet* data communications software, \$395.

Requires: 640K RAM; DOS 2.1 or later.

In Short: The Ricoh ImageCard is designed as a broadcasting tool for heavy fax users. In effect, it offers a wide-area network fax-file server for fax machines and PCs equipped with Ricoh's *ImageNet* software. While not a good choice for simply adding fax features to a PC, it may be the only choice for those who need the broadcasting features.

Circle 409 on Reader Service Card

WE STAND BEHIND OUR LAN

NEXOS is the LAN system guaranteed to satisfy your vital business requirements. It's backed by DSC Communications Corporation, the worldwide supplier of telecommunications and networking equipment. NEXOS' advanced features plus DSC's unequalled commitment to customer service add up to complete LAN Satisfaction.

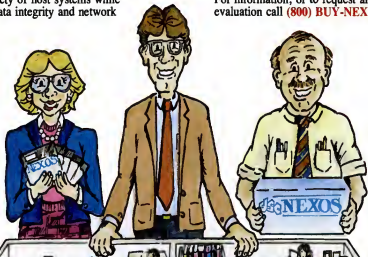
The NEXOS 386 protected mode implementation and integrated database engine deliver unmatched PC LAN performance. It's NetBIOS and TCP/IP compatible, runs all DOS-based applications and can be configured for Ethernet, Token-Ring and ARCnet.

NEXOS means reliable connections with a variety of host systems while ensuring data integrity and network

security. Powerful menus and on-line help make NEXOS easy to install and use.

We stand behind our LAN with high quality, single-source products and services. There's no substitute for factory integration, on-site service and expert technical support on demand.

When you're ready for a LAN vendor whose number one priority is customer satisfaction, you're in the market for DSC. Call now and we'll prove it with a 30 day evaluation of our NEXOS Operating System, and a free 30 day subscription to our LAN Support Program; offer expires Nov. 17, 1989. For information, or to request an evaluation call (800) BUY-NEXOS



Call or write for additional information: DSC Communications Corporation,
P.O. Box 110940, Campbell, CA 95011. (800) BUY NEXOS.

Name _____ Title _____
Company _____ Address _____
City _____ State _____ Zip _____ Phone _____



DSC Communications
Corporation



Fax Boards: Compatibility Chart

Because a communications standard can turn out to be less standardized than you might expect, PC Labs tested the compatibility of PC fax boards that are touted as adhering to the Group 3 standard. Using two fax machines, we tried sending a two-page message from each board reviewed to each of the other boards. We also tested each fax board for compatibility with two of the more-commonly-used stand-alone fax machines, the Canon FaxPhone 20 and the Ricoh FAX60. The sending systems are listed along the top of this chart; the receiving systems are listed down the side.

For the purposes of this test, we accepted as a "pass" any transmission that succeeded in transferring both pages within three trials. Failures ranged from cases where two packages could not establish communications to cases where the packages could transmit the first page but lost the second. Most disconcerting were those failures that were recorded in the logs of both packages as successes—without any file being produced on the receiving side.

The compatibility tests showed expected anomalies. Some pairs of packages (such as the ImageCard and The Complete Fax/9600) won't talk to each other at all. Others (such as the JT-Fax 9600 and The Complete Fax/9600) will transmit data only in one direction.

The point of this exercise is not only to demonstrate the compatibility of each board with the others, but to show how much variation there is in the manufacturers' interpretations of the Group 3 standard. This is true for fax machines as well as fax boards.

As these compatibility tests show, the fax industry has yet to hammer out the details of the Group 3 standard. This is partly owing to the relative newness of the standard; moreover, there is no one dominant manufacturer the rest of the industry can follow. As a result, you cannot be absolutely sure that any given fax package can talk to any other—be it a PC-based system or a stand-alone machine.

RECEIVING

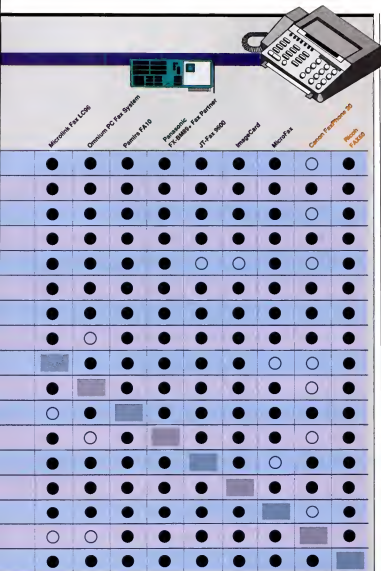
SENDING

	SMARTFaxplus	AT&T Fax Connection	FaxMod 96	Bromer IntelliFax	The Complete Fax/9600	Facsimile Fax	QuantumFax	Connection Communications
SMARTFaxplus	●	●	●	●	●	●	●	○
AT&T Fax Connection	●	■	●	●	○	●	●	●
FaxMod 96	●	●	■	●	○	●	●	●
Bromer IntelliFax	●	○	●	■	●	●	●	●
The Complete Fax/9600	●	●	●	●	■	●	●	●
Facsimile Fax	●	○	●	●	●	■	●	●
QuantumFax	●	○	●	●	●	○	■	●
Connection Communications	●	●	●	○	●	●	○	●
ImageCard	●	●	●	●	●	●	●	●
OmniFax PC Fax System	●	●	●	●	●	●	●	●
Power FAX	●	●	●	●	●	●	●	●
Personal Fax Printer	●	●	●	●	●	●	●	●
FAX-Modem Fax Printer	●	●	●	○	●	●	●	●
JT-Fax 9600	●	●	●	●	●	●	●	●
ImageCard	●	●	●	●	●	●	●	●
ImageFax	●	●	●	●	●	●	●	●
Canon FaxPhone 20	●	●	●	●	●	●	●	●
Ricoh FAX60	●	●	●	●	●	●	●	●



●—Yes ○—No
 ■—Not applicable: the product was not tested for compatibility with itself.





in more detailed—and more accurate—error reporting than is the case with most fax boards. Ricoh also boasts that the package has been tested with more than 100 machines and is compatible with them all.

The ImageCard was designed as a broadcasting tool for high-volume fax users. A remote-control feature will let you send a file to the ImageCard from a fax machine, then use the ImageCard to distribute the fax to other locations.

A related feature is the \$395 *ImageNet* option. With *ImageNet* running on the PC with ImageCard and on a remote PC, you

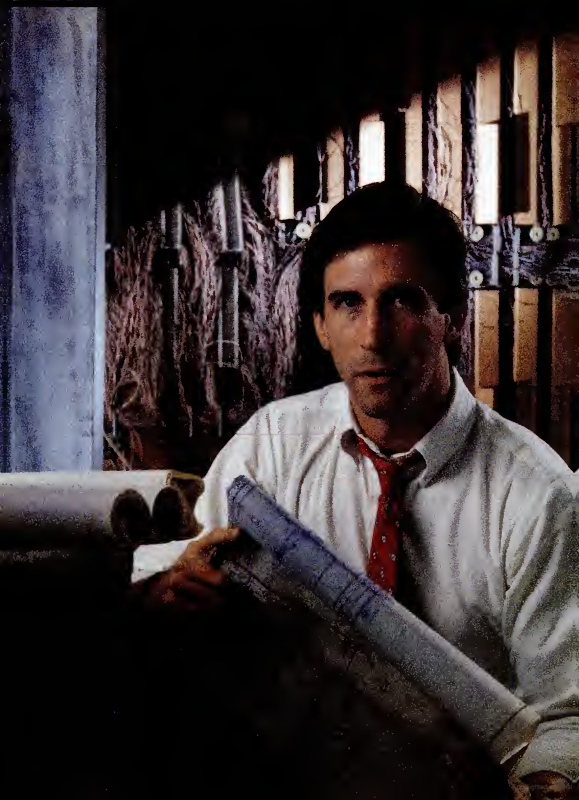
■

***A remote-control
feature will let
you send a fax to your
computer, then
use the ImageCard to
distribute the fax
to other locations.***

■

can call the ImageCard from the remote location and send it a fax through a standard modem. (The modem is not included in the fax package.) The ImageCard can then resend the fax. In short, *ImageNet* gives fax capabilities to the remote PC without needing a fax board. (The *ImageNet* software and remote operations feature were not tested for this review.)

IMPROVEMENTS ON THE WAY The broadcast features in the ImageCard package stem from Ricoh's background as a fax machine manufacturer. Alas, Ricoh's background shows elsewhere as well. In particular, the software was designed with little thought for the PC market, resulting in a limited and often clumsy package. On the plus side, an improved version of the software and documentation is in the works. Because the software is in beta test, this review is necessarily based on the older, 1.22 release. However, Ricoh also sup-



"Avoiding the high cost of network wiring — that's my Preference."

Now you can install your network using existing phone wire, and get Ethernet performance, too.

Introducing the total solution for Ethernet network performance without the cost of cumbersome cabling. Western Digital's Preference™ family of network products makes it easier and more economical than ever to create new networks and expand existing coaxial Ethernet systems, too—using wire that's already in the wall.

A Preference for Existing Cabling.

The surprise expense in PC networking has been cabling installation. Coaxial connections not only cost a bundle initially, there are hidden costs in network maintenance and expansion.

Now you can add a network node at any time, wherever there's a phone jack. Our EtherCard PLUS TP™ LAN adapter takes advantage of unused twisted pairs of wires in your phone system, without any disruption of voice communication. Nothing could be easier or more flexible.

A Preference for Complete Solutions.

Western Digital's Ethernet

Twisted Pair products provide you a complete solution.

You can connect up to eight PCs to each WD™ LattisNet Concentrator in your network. The concentrators themselves can be interconnected via Thin Ethernet for easy expandability, or tie directly into an existing Ethernet network.

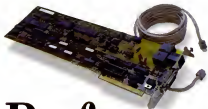
Mix conventional Ethernet adapters and our twisted pair adapters in the same network using the WD LattisNet Transceiver. That way you don't have to replace existing hardware when you expand with our twisted pair solutions.

So avoid the high cost of network wiring. Call your network dealer. And express your Preference. *When you're in touch with technology, you're in touch with Western Digital.*



Our Twisted Pair products provide flexibility for new and existing installations.

Certified with
all Novell NetWare
2.1x versions.

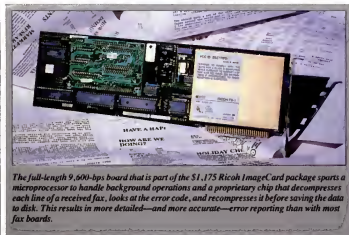


Preference™

WESTERN DIGITAL

Preference and EtherCard PLUS TP and WD are trademarks of Western Digital Corporation. Other marks noted herein belong to other companies.

CIRCLE 239 ON READER SERVICE CARD



The full-length 9,600-bps board that is part of the \$1,175 Ricoh ImageCard package sports a microprocessor to handle background operations and a proprietary chip that decompresses each line of a received fax, looks at the error code, and recompresses it before saving the data to disk. This results in more detailed—and more accurate—error reporting than with most fax boards.

plied a beta release of Version 2.03.

In both versions, the master menu offers three choices for fax transmission. The Telephone Network choice includes options to send a fax, receive a fax, and display an image. Unfortunately, the software module is modeled too closely on a fax machine. For example, if a transmission fails, you have to start over again, reentering the file to send and the phone number to send to.

■

***The Ricoh ImageCard
is by far the most
expensive fax package
reviewed here.***

■

Some limitations are handled in the main menu's Document Distribution choice. This module contains a phone book for individuals and groups, with up to 200 numbers per group. It will also let you schedule faxes and will automatically retry when a transmission fails. Oddly, for a package that concentrates on broadcast functions, it is limited to about 250 scheduled transmissions, with a transmission

defined as one image file going to one phone number.

The third choice on the main menu lets you automatically negotiate connections with a data network—be it Tymnet or a dedicated private data line—so you can send faxes over that network.

The documentation gets good marks for organization but is written in a jargon-laden technostyle that will never use one word where five will do. Worse, it is printed in landscape orientation, so that reading the manual is clumsier than it has to be. According to a Ricoh spokesman, the manual for Version 2.03 will be completely rewritten and will be printed in portrait orientation.

Missing from this package is any direct support for scanners. Version 2.03 will include scanner support, but only for the Ricoh IS10, IS30, SS30, RS320, and compatibles—and even then without a dithering feature. Printer support is similarly weak, with choices for only the Xerox 4045, HP LaserJet Plus, IBM, Epson, Okidata 92/93, and AST Turbo printers.

Finally, the Ricoh ImageCard is by far the most expensive fax package reviewed here. At \$1,175, it costs almost 20 percent more than the next most expensive package. According to a Ricoh spokesman, the price will drop significantly with Version 2.03; but the new price has not been determined as of this writing.

Regardless of price, the ImageCard is of little interest to those who simply want to add a fax capability to their PCs. But for those who can make use of the broadcasting capability, the data network feature, or both, the Ricoh ImageCard is an interesting possibility.—M. David Stone

**XEROX IMAGING
SYSTEMS/DATACOPY**

MicroFax

When we last reviewed the MicroFax, its manufacturer was an independent. Now it's the Datacopy products group of Xerox Imaging Systems. Fortunately for the MicroFax, this new business arrangement didn't result in the product's getting lost in the bureaucracy of a large organization: Version 2.0 of the \$695 system brings new and enhanced features to an already strong product.

The MicroFax is a full-sized 9,600-bit-per-second fax board with an on-board 1,200-bps Hayes-compatible modem. It should be noted, however, that no modem communications software is included, so you'll need to supply your own. All standard fax operations are controlled with the MicroFax software.

The MicroFax's upgrade path, which is taken care of through software, reflects the product's maturity. As the vendor adds new features, all you'll need to do is get a new disk; because you won't have to re-



FACT FILE

MicroFax

Xerox Imaging Systems/Datacopy
1215 Terra Bella Ave.
Mountain View, CA 94043
(415) 965-7900
List Price: \$695

Requires: 512K RAM; hard disk, IBM PC, XT, AT, any PS/2 or compatible, CGA, EGA, VGA, Hercules, or many other graphics cards for viewing; DOS 2.0 or later.

In Short: Easy to install and use, the Datacopy MicroFax is a bargain with its on-board 1,200-bps modem and full set of features. Its only limitation is its inability to handle grayscale transmissions, except through an approximation technique called dithering.

CIRCLE 410 ON READER SERVICE CARD

A Few Words From The World's Most Celebrated Graphics Software.



Thank you. For those of you who haven't heard, Harvard Graphics from Software Publishing has gotten a lot of recognition from the trade press. Why, you may ask? Certainly our crisp, high-speed output helped influence InfoWorld readers to name us Product of the Year. And the easy access to so many chart and graphing options must have helped PC World's audience give us their World Class Award for

the second year running.

Actually it must have been all those things and more. Otherwise why would PC Magazine call Harvard Graphics "the de facto standard" software for business graphics?

Of course, the experts aren't the only ones who favor Harvard Graphics. In fact, with its growing popularity, Harvard Graphics has become the number-one selling business graphics software.

And naturally we'd like to invite those of you who haven't tried Harvard Graphics to call us for a free trial disk at the toll-free number below.

In a matter of minutes, it'll give you a vivid demonstration of the qualities that make us the graphics superpower.

SRC SOFTWARE
PUBLISHING

FREE TRIAL DISK, CALL 1-800-345-2888, OPERATOR 53. FOR UPGRADE LITERATURE CALL 1-303-799-4900.

© 1989 Software Publishing Corporation, 1901 Landings Dr., Mountain View, CA 94039-7210

■ FAX SYSTEMS



Although you'll have to supply your own communications software, the full-length 9,600-bps board that is part of the \$695 MicroFax system from the Datacopy products group of Xerox Imaging Systems has a built-in 1,200-bps Hayes-compatible modem.

place the board, you'll save money and time.

A new version of the software, which should be available by this time, will automate installation. Even so, installing the current version is a snap, merely requiring you to answer a series of simple on-screen questions.

MEMORY-SAVING SOFTWARE MicroFax software isn't a TSR, but it can send and receive in the background. The resident program requires only a frugal 4K of memory—a nice switch from some memory-hungry TSRs. The background feature worked reasonably well in our error-handling tests, continuing to receive a file when asked to log on to an empty drive.

If the computer was already trying to read an empty drive or pausing a screen, however, an incoming fax call would not connect. A call coming in while the computer was printing out a file caused no problems for the MicroFax. The program does not protect against a warm reboot, though, which means that an incoming fax will be terminated if the Ctrl-Alt-Del key-stroke combination is used during a transmission. In all cases we were sending faxes from one MicroFax to another, and the sending program rescheduled unsuccessful connections or incomplete transmissions for a later time.

The MicroFax user interface is menu driven and simple. The program is divided

into three basic sections: Commands, Logs and Files, and Set Up. You select any one of these sections from a horizontal-bar menu. After you've made a selection, a pull-down menu appears with more specific subcommands or program functions. All operations are accessed through menus; the software does not offer hot-keys.

BEYOND THE BASICS Besides standard fax operations, the MicroFax gives you several extra capabilities. You can capture both text and graphics screens for either immediate or later transmission, and you can also transmit originals directly from a scanner and from ASCII and graphics files. MicroFax works with PCX, GEM, TIFF, IMG, and AutoCAD graphics files. But you'll have to work with those files as they are, since there are no built-in graphics editing capabilities. Both ASCII and graphics files are converted to fax format prior to transmission, with the conversion process done in the foreground.

The MicroFax also lets you set up phone books and schedule calls for later transmission. The software maintains logs of all transactions, which can be printed as well as displayed. Although the MicroFax software does not offer the ability to handle gray scales (except by dithering), it does let you select between normal- and high-resolution modes and normal and compressed fonts.

There's no automatic cover-page fea-

ture, but there is a way for you to include a document header with your transmission. For manual calling, you can switch between voice and fax transmission modes both before and after sending a fax. Furthermore, the MicroFax supports Group 3 polling and turnaround polling.

The MicroFax works with all stand-alone fax machines, except for one obscure Fujitsu machine, according to the vendor. We had no problems working with two fax machines at PC Labs. In our performance tests, we used the MicroFax with the Datacopy 730GS scanner; it can be set to work with all other Datacopy scanners as well as the IBM 3117, HP ScanJet, AT&T Overview, Canon IX-12, Microtek MS-300A, Panasonic FX-RS505, Princeton LS300A, Shape's ShapeScan SS-240, Tall Tree Systems' J laser scanner, and all Ricoh scanners. The MicroFax has drivers for most printers, including those that work with the PostScript page description language. Sample output produced on our HP LaserJet Plus looked fine, with no aspect ratio distortion. The

■

*The MicroFax's
upgrade path is taken
care of through
software. As the vendor
adds new
features, all you'll need
is a new disk.*

■

MicroFax board can also transmit oversized sheets of paper, handling our 28-inch test sample without a hitch. (However, since the accompanying software can't handle gray scales, the transmitted photo was reproduced in black and white.)

Considering that other fax boards with similar features that include a modem typically cost a couple of hundred dollars more, the Datacopy MicroFax is a good buy for most users. It can't handle gray

The Experts in Accessories

CURTIS

DIAMOND SP-1

Switched, adapts to duplex outlet + 4 Outlets, 15 Amps Total 125 Volts, 1875 Watts • Operating Temperature: -40°C to +85°C • Peak Pulse Power Dissipation in 25°C, 585,000W for 20 Micro Sec • Maximum Clamping Voltage in Test Current 50A (8/20 Micro Sec) 340V • Clamping Occurs Line to Line (Normal Model) and Line to Ground (Common Model) • Clamping Response Time 1 Nanosecond (1 x 10⁻⁹ sec) • Diode Test: 3000 VAC 60 Sec • Forward Surge Rating in 25°C, 1440 Amps for 1/120 Sec, Lifetime Warranty

Retail \$59.95

RUBY SPF-2

Switched, EM-80 Filtered, plugs into duplex outlet + 4 power cord, built-in Circuit Breaker + 6 Outlets, 15 Amps Total 125 Volts, 1875 Watts • Operating Temperature: -40°C to +85°C Peak Pulse Power Dissipation in 25°C, 585,000W for 20 Micro Sec • Maximum Clamping Voltage in Test Current 50A (8/20 Micro Sec) 340V • Clamping Occurs Line to Line (Normal Model) and Line to Ground (Common Model) • Clamping Response Time 1 Nanosecond (1 x 10⁻⁹ sec) • Diode Test: 3000 VAC 60 Sec • Forward Surge Rating in 25°C, 1440 Amps for 1/120 Sec • Mode Noise Protection, Normal and Common Mode • Noise Rejection Frequency: 100KHz - 30MHz • Attenuation: 50dB - 80dB, Lifetime Warranty

Retail \$99.95

EMERALD SP-2

Switched, plugs into duplex outlet + 4 power cord, built-in Circuit Breaker, 6 Outlets, 15 Amps Total 125 Volts, 1875 Watts From Single or All Combined • Operating Temperature: -40°C to +85°C • Peak Pulse Power Dissipation in 25°C, 585,000W for 20 Micro Sec • Maximum Clamping Voltage in Test Current 50A (8/20 Micro Sec) 340V • Clamping Occurs Line to Line (Normal Model) and Line to Ground (Common Model) • Clamping Response Time 1 Nanosecond (1 x 10⁻⁹ sec) • Diode Test: 3000 VAC 60 Sec • Forward Surge Rating in 25°C, 1440 Amps for 1/120 Sec, Lifetime Warranty

Retail \$69.95

All Curtis Surge Protectors meet or exceed IEEE standards 587-1980 Guide for Surge Voltages in AC Power Circuits.

SAPPHIRE SPF-1

Switched, EM-80 Filtered, adapts to duplex outlet + 3 Outlets, 15 Amps Total 125 Volts, 1875 Watts From Single or All Combined • Operating Temperature: -40°C to +85°C • Peak Pulse Power Dissipation in 25°C, 585,000W for 20 Micro Sec • Maximum Clamping Voltage in Test Current 50A (8/20 Micro Sec) 340V • Clamping Occurs Line to Line (Normal Model) and Line to Ground (Common Model) • Clamping Response Time 1 Nanosecond (1 x 10⁻⁹ sec) • Diode Test: 3000 VAC 60 Sec • Forward Surge Rating in 25°C, 1440 Amps for 1/120 Sec • Mode Noise Protection, Normal and Common Mode • Noise Rejection Frequency: 100KHz - 30MHz • Attenuation: 50dB - 80dB, Lifetime Warranty

Retail \$89.95

The Ones To Ask For

Curtis Electronic Surge Protectors are built to provide surge protection for any microcomputer for a lifetime. Constructed with precision, using advanced semiconductor technology, the Curtis Jewels prevent damage to microcomputer systems and data from powerline overvoltage



"surges, spikes and glitches." Surge protection from the Curtis Jewels is your guarantee of the best line of defense for your valuable hardware and data, at a price that won't shock you. Get your computer the protection it deserves with Curtis — the experts in accessories.

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains.

In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612

For the Curtis dealer nearest you call (603) 532-4123 Ext. 871



Manufacturing Company, Inc.
CURTIS

30 Fitzgerald Drive, Jaffrey, NH 03452
A subsidiary of Rolodex Corporation

An
Italian
International
Specialty
Company

We have one thing to say to the people who keep getting personal about PROCOMM PLUS.

"Right now, PROCOMM PLUS is the definitive telecom program and the one I personally use and recommend."

John C. Dvorak,
columnist, PC Magazine

People who review software have a very tough job. They see hundreds of new programs every week. But the ones who have seen the new PROCOMM PLUS communications software are doing more than writing rave reviews about it. They're getting personal. They're using it at work and at home.

Maybe it's because PROCOMM PLUS is so easy to use it's "intuitive." Or perhaps it's because PROCOMM PLUS has an extremely powerful script command language, context sensitive help, 16 terminal emulations with keyboard re-mapping, 12 file transfer protocols, a fully-automated dialing directory, and advanced host mode with electronic mail.

But one thing is for certain, if PROCOMM PLUS is the personal choice of the people who review software, you can be sure that PROCOMM PLUS is right for you.

It's time you got personal about PROCOMM PLUS. Ask for PROCOMM PLUS at a dealer near you. Or, call 314-474-8461.

Thank You.



■ FAX SYSTEMS

PC EDITOR'S CHOICE

- Connection CoProcessor
- JT-Fax 9600

In PC Magazine's last roundup of PC-compatible fax systems, we singled out several products—Quadram's JT-Fax, GammaLink's GammaFax, Datacopy's MicroFax, and Panasonic's Fax Partner—for honorable mention, but we didn't award any one board an Editor's Choice for a simple reason: not one of the packages was a fully finished product. That situation, we're happy to report, has changed, and there are now several packages that we can wholeheartedly recommend.

If you want a package that maintains the ease of use of a fax machine while taking advantage of the capabilities of a PC, you have at least two good choices. The \$995 Intel PCEO Connection CoProcessor offers an easy-to-use menu structure, free technical support, excellent error handling, and a 5-year replacement warranty. Missing from the package is the ability to capture printer output from an application to send as a fax. However, the Connection CoProcessor is the first piece of hardware to support CAS, and if the industry adopts it, the board will be able to send faxes from any program with a built-in CAS interface.

Quadram's JT-Fax 9600 is another good choice. It sports a simple menu structure, somewhat better-than-average speeds on PC Labs' timing tests, and a price of \$795. Most important, this version reme-

diates two drawbacks that kept the original JT-Fax from earning an Editor's Choice designation: its limitation to 4,800-bps operation, and a TSR feature that popped up in the middle of other applications when you sent or received faxes.

An honorable mention goes to The Complete Fax9600, from The Complete PC. The \$699 package has almost as well designed a menu structure as the Connection CoProcessor and adds the ability to send faxes by capturing printer output. Unfortunately, its speed is on the low side of average, but it is a solid product, well worth your attention.

An additional honorable mention goes to the AT&T Fax Connection, which was the fastest performer on two of the three PC Labs benchmark tests. As tested, the \$995 board takes its marching orders only from the DOS command line, a method that may be intimidating to novices. Of course, for an additional \$295 (or an extra \$200, if purchased with the board), you can buy PagePower, an integrated set of fax, scan, draw, and communications programs that runs under Microsoft Windows and makes the system more user friendly. But that extra cost brings the price of the Fax Connection well into the range of fax machines, which is something you should consider before you take the plunge.

scales and its modem can't exceed the speed of 1,200 bps, but the MicroFax's fine background operation and easy menu operation make it a good choice for general use.—Bruce Brown

John Britton is a writer and computer con-

sultant living in New York. Bruce Brown is a frequent contributor to PC Magazine. Robert Kendall is a New Jersey-based free-lance writer and editor who specializes in computers. Edward Mendelson, Robin Raskin, and M. David Stone are contributing editors of PC Magazine.

Each One Is A Landmark Of Power.
A Technical Masterpiece.
The Answer To A Specific Need.



AST makes the fastest and highest-quality desktop computers in the business world. One of them is right for you. Whether you need a personal computer for general office work, engineering, desktop publishing, financial analysis or running your business at home, you can count on AST to fit your desktop size, your budget and your need for ultimate speed.

Our Newest Wonders. If you want extra performance and high quality without spending a lot of money, try our newest computers — the AST Premium® 386/16 and the AST Bravo/286. Our cache-based AST Premium 386/16 makes 386™-CPU computing available to even the most cost-conscious budget. And the AST Bravo/286 is all the AT™-compatible power you

INFO WORLD REPORT CARD		
AT Performance	Executive Bravo/286	AST Premium 386/16
5.0	7.5	8.0
First Steps — 10 days, 100,000 Computer Days, 1988		

*Source: PC Week, Nov. 14, 1988.

AST, AST logo and AST Premium registered trademarks AST Research, Inc. 80386 and 80387 trademarks Intel Corp.
AST markets products worldwide — in Europe and the Middle East call 44 1 566 4360; in Japan call

need to manage your small business or home office, or use it as a node in a local area network.

Our Most Powerful Wonders. For high-speed CAD/CAM/CAE, multitasking, multiuser environments and LAN file service, choose AST's top performing systems. The 25 MHz AST Premium 386/25 and 20 MHz AST Premium/386C bring the highest performance to your sophisticated 386-CPU based applications.

Our Most Versatile Wonder. If you have to choose one computer that satisfies the broadest range of needs, let it be the AST Premium/286. Perfect for flying through word processing, large spreadsheets and even technical applications, it's the industry's award-winner for 286 performance and value.

Our Smallest Wonders. When your desktop space

AST Premium/286
★★★★★
Top Rated
'86 PC
—PC Digest
May 1988

AST Introduces T Of The Bus

AST Bravo/286
Extra value, quality
and AT-compatibility
for business or
home office use.

**AST Premium
Workstation/286**
Executive styling
and test-proven AT
compatibility in a
powerful 286 computer.

AST Premium/286
Outstanding, industry
winner for general
business and technical
applications.

AST Premium 386/25
State-of-the-art
solution for ultimate
LAN file service and
CAD/CAM/CAE.

is limited, but your appetite for speed and power isn't, the AST Premium Workstation/386SX and the AST Premium Workstation/286 offer test-proven compatibility you can rely on. These sleek, small-sized wonders are the quality answer to cost-effective, high-performance desktop computing.

AST Service, Support And Reliability — The Eighth Wonder. The AST logo means quality products and service. In fact, PC Week recently named AST first in technical support, over Compaq® and IBM®.*

For the products and service that will make you the next wonder of the world, ask for AST Computers. For more information, call (714) 863-0181 and ask for operator BB8, use our Bulletin Board Service number (714) 852-1872, or fill out the coupon.



- ☐ Please send me information on AST computers.
☐ Please have an AST representative call me.
 I am ☐ an end user ☐ a reseller.

Name

Title

Company

Address

City/State/Zip

Phone

AST Research, Inc. 2121 Alton, Irvine, CA 92714-4992. Attn: M.C.



Times Have Changed.
CIRCLE 166 ON READER SERVICE CARD

All other product and brand names are trademarks and registered trademarks of their respective companies. Copyright © 1989 AST Research, Inc. All rights reserved.
 RT 3 858 0790; in the Far East call our Hong Kong office 852 9 806 4333; in Canada call 416 836-7514.

The Seven Wonders in Business World.



AST Premium/386C
 Multitasker, multitasking
 386-CPU powerhouse
 with integrated cache
 architecture.



AST Premium 386/16
 Cache-based, true 32-
 bit, 386 CPU processing
 for sophisticated, yet
 affordable computing.



**AST Premium
 Workstation/386SX**
 Executive styling
 in a cost-effective,
 entry-level 386-
 CPU system.



For all practical purposes.

Hyundai's PC-compatibles aren't flashy, just functional. And are designed to give practical people like yourself one of the best values in computers today.

For the price you might pay for some compatibles, you can actually afford two Hyundais. One for the office, one for the home.

And Hyundai offers you a full range of practical solutions. From our 8/10 MHz XT-compatible, the Super-16TE; to our small footprint AT-compatible,

the Super-286c; to our diskless PC Terminal; and our "plug and play" LAN package—the simple answer to your networking needs. And they all come with an 18 month warranty.* You'll probably never need it but it's nice insurance to have.

Of course, you could spend more on a fancier computer. But why? When for all practical purposes, you can own a Hyundai.

For the Hyundai dealer nearest you, call 1-800-727-6972 ext. 119.

▲HYUNDAI™
Practical Compatibles

*See dealer for complete warranty details.
© 1990 Hyundai Electronics America. XT/AT are trademarks of IBM.

CIRCLE 336 ON READER SERVICE CARD

An Alliance of Convenience

DOS UNDER UNIX

DOS-under-Unix software offers PC users a way to merge the strengths of two operating systems, affording them more power and flexibility than either system could offer independently.

If one operating system has profited from the confusion that OS/2's arrival has introduced in the PC market, it's Unix. For as PC users take a hard look at whether OS/2 is the answer to dealing with such thorny problems as multitasking, they are also remembering that Unix has offered that advanced capability and a whole lot more on mainframes and minicomputers since the early 1970s. And now that the advent of cheap 80386 32-bit processing power makes the PC a legitimate hardware platform for Unix (and also one that is similar to the minicomputers on which Unix was developed), Unix has become a viable, attractive option for people who are thinking about upgrading from DOS to a different and more powerful operating system.

VIRTUAL 8086 MODE: THE KEY TO RUNNING MULTIPLE DOS SESSIONS ON A 386 MACHINE

Virtual 8086 mode—a mapped, protected operating mode of the 80386 chip—allows a host 80386 machine to imitate an ordinary PC nimbly and convincingly.

Despite its faults, the 8086 chip has proven to be the most successful platform for business applications. That's why, when Intel designed successor products, it made sure to provide for strict backward compatibility with the family patriarch.

When power is applied and an 80286 or 80386 machine comes to life, it starts out in the guise of a humble 8086; thus it is an acceptable hardware platform for ordinary 8086 applications. In this instance, the 286 or 386 runs in real mode, but both microprocessors can support protected modes as well. Protected mode facilitates running several tasks concurrently because it permits isolating each task. Although the 286 has a protected mode of operation, it retains the 8086's 16-bit architecture. The 386 removes the 16-bit limitation in protected mode, and it also has virtual 8086 mode, which is used by DOS-under-Unix software.

When you run a 286 in protected mode, you can utilize up to 16MB of memory (instead of the 1MB potentially addressed by the 8086), and you get memory management, which allows the

operating system to institute security measures. Unfortunately, there is no simple route that an advanced operating system like OS/2 or Unix can take back to 8086 real mode. OS/2 is able to switch between 286 protected mode and 8086 real mode. But to do so, OS/2 must go through the motions of restarting your machine, which means that you are limited to one real-mode process at a time.

When a 386 shifts into protected mode, the potential memory you can address goes up to 4 gigabytes. The internal architecture of the CPU goes to 32 bits (which makes it easier to work with large programs and large data sets), and you also get memory management and virtual 8086 mode.

A mapped protected mode of the 386 processor, virtual 8086 mode is essentially an illusion. It makes use of some of the attributes of both real and protected modes, allowing your DOS-under-Unix program to set up a PC-like environment from within protected mode. An application that runs in this environment will think it is running in an ordinary 8086-based PC; little does it know that a pow-

erful 386 is pulling the strings to make everything work. For example, many DOS programs routinely write characters to the display screen addresses of the PC. When these programs run in virtual 8086 mode, they still write to those addresses, but the addresses no longer refer to the screen. It's up to the 386 to decide if and when that information should be displayed on the screen of the computer.

Using virtual 8086 instead of real mode gives you much more flexibility. If a 386 machine has 6MB of memory, for example, it can take the top half of that memory and set up three independent virtual 8086 environments of 1MB each, in which different DOS sessions can be run. Each environment is isolated, so that an ill-behaved application in one can't corrupt the others. Of course, from Unix's perspective, each of these three environments is simply a task that should be allocated time slices, just like all the other active tasks in the system. In addition, virtual 8086 environments can be swapped out to disk so that you can run more than will simultaneously fit in memory. This is why the Unix system,

Of course, people who have worked in organizations where DOS and Unix have been coexisting on different hardware platforms have known all this for some time now. What they might not know is that the 386 chip, through its virtual 8086 mode, offers them a way to bring the power of DOS applications to the Unix world while at the same time bringing much of the power of Unix to the DOS world, without sacrificing most of the amenities exclusive to each.

The virtual 8086 mode makes it possible to multitask multiple DOS sessions un-

der Unix on a single 386 machine. In this arrangement, each DOS application runs in its own virtual machine. In its ability to handle multiple DOS sessions as well as multiple users, Unix goes OS/2 one better: OS/2, a single-user, multitasking operating system, does not support the virtual 8086 mode of the 386 microprocessor. OS/2 can therefore run DOS software in its compatibility box, but only one session at a time. (See the sidebar "Virtual 8086 Mode: The Key to Running Multiple DOS Sessions on a 386 Machine.")

Several software products, known as

DOS-under-Unix environments, make use of the 386's virtual 8086 mode to couple DOS and Unix. Reviewed here are two of these products. The first is *VP/ix*, a collaborative venture of Interactive Systems Corp., a long-time Unix vendor, and Phoenix Technologies, known for its BIOS compatibility software; the second is *Merge 386* from Locust Computing Corp., a company known for its DOS-to-Unix bridge products (in particular, *PC-Interface*, a DOS-to-Unix networking product). Both *VP/ix* and *Merge 386* were first released in 1987 and have undergone one

which uses virtual 8086 mode for DOS applications, can run several concurrently, while OS/2, which uses 8086 real mode to run DOS software, can handle only one DOS task at a time.

VP/ix and *Merge 386* set up a virtual 8086 environment that duplicates the hardware/software environment of an ordinary PC, as far as possible, with the effect that DOS and most DOS applications are fooled. For example, the screen buffer and the BIOS software must be where they are expected, the BIOS level interrupts and services must work as expected, and the communication ports must function correctly. The environment must be convincing enough that DOS can load and operate normally, because *VP/ix* and *Merge 386* actually run DOS; they don't simulate it.

As it stands, both products fall short of precisely imitating every aspect of the PC's hardware, and both have problems handling software that is ultrasensitive to timing. As a result, they won't be able to run every DOS application under the sun—just the vast majority.

—Kaare Christian

major revision each. Although the two products are more alike today than they were when they were first released, *VP/ix* is directed toward users who require convenient DOS-under-Unix capability, while *Merge 386* is targeted toward users whose systems are burdened with heavy multiuser loads where performance and configurability are important.

SECONDARY VENDORS Both *VP/ix* and *Merge 386* are available from many secondary vendors, some of whom add related features that enhance these DOS-



1,200 FAXES Out by Noon... With FaxCast, No Sweat

FAX communications are fast, reliable, easy-to-use and relatively inexpensive. But, sending a document to tens, hundreds or thousands of FAX machines is tedious—requiring hours of manual input on most FAX machines. Even the best FAX equipment can't meet this challenge.

FaxCast — Fast, Reliable, Low Cost

Now you can broadcast to multiple FAX addresses using an IBM compatible PC and Xpedite FaxCast™ service. You simply send your FAX address list and your message through FaxCast service. Your message is electronically merged with your addresses and automatically delivered. FaxCast service offers a variety of options including the use of your letterhead and the ability to send graphics. You can specify when your broadcast will begin or have delivery done overnight—when one page documents can be delivered for less than 25-cents.*

Convenience & Higher Quality

You'll try Xpedite FaxCast for convenience and low delivery prices; but, you'll stay for quality and reliability. Documents delivered through FaxCast are clearer than documents sent from FAX machines — and Xpedite FaxCast is the reliable means of broadcasting FAX communications.

To find out how Xpedite FaxCast will help you, give us a call.

call today
1-800-227-9379
IN N.J. CALL 201-389-3373



Xpedite Systems, Inc.

446 Highway 35
Eatontown, NJ 07724

*Delivery charges based upon output time and vary by document length and density.

SPF/PC®

*Bridging the
Micro-to-Mainframe
Editing Gap*

Now you can re-create the mainframe editing environment on your own PC with SPF/PC, the only PC editor functionally equivalent to editing with ISPF/PDF Version 2, Release 2 on MVS.

Files of virtually any size may be edited with SPF/PC because it uses all extended or expanded memory, or disk drive work space.

Mainframe users will especially appreciate SPF/PC's familiar commands, fast PC processing and micro-to-mainframe file portability. SPF/PC also offers:

- True split screen
- Directory/member lists
- Command stacking
- Binary file editing
- Hexadecimal editing
- Network support

Want proof? Ask for a free, interactive demonstration diskette.



SPF/PC® — so much like the real thing, you'll forget you're editing on a PC.

CTC

Command Technology
Corporation

1900 Mountain Blvd., Oakland, CA 94611
Phone: (415) 339-3530 FAX: (415) 339-3883
Orders only: (800) 336-3320 (Canada, U.S.)

■ DOS UNDER UNIX

under-Unix environments. Some offer DOS-under-Unix products designed for specific hardware platforms. Others offer related networking products, the capability to mount DOS file systems onto the Unix file system, and compatibility with the emerging X Window environment—a graphical user interface developed at Massachusetts Institute of Technology that adds windows and graphics extensions to the Unix operating system.

Because of the similarities between *VP/ix* and *Merge 386* and their variants, we decided to test the primary products in just one Unix environment: *VP/ix* was tested under Interactive Systems' own Unix environment, *386/ix*; *Merge 386* was tested under Bell Technologies' Unix System V, Release 3.0. The testing and evaluation focused on the DOS-under-Unix products, not on the host Unix environment, although the performance of the host Unix software does have an important impact on file I/O operations. The performance of computationally intensive operations, which are more internal to the virtual 8086 environment, is determined by *VP/ix* and *Merge 386*.

Of all the vendors that have enhanced *VP/ix*, Sun Microsystems has probably done the most customization. Sun Microsystems made extensive changes to *VP/ix* so that it can work smoothly with *DOS Windows*, a windowing environment that is bundled with the Sun 386i computer. (For this reason, the review of *VP/ix* in this issue has only limited applicability to those considering the Sun product.) Sun Microsystems' version of *VP/ix*, which comes with both the Sun 386i/150 and Sun 386i/250, allows DOS text or graphics applications to run in windows on either machine's large, high-resolution screen; allows cutting and pasting of data between windows; comes with Sun Organizer, an icon-based interface to both Unix and DOS software and files; lets you dynamically attach and detach nonshareable devices, such as floppy disk drives and communications ports; lets you run selected DOS networking products in the DOS environment; includes a *Microsoft Windows* 2.01 driver so that *Windows* can use the full screen; and allows for per-drive file sharing and per-drive file and record logging over the network. The base prices of

the Sun 386i/150 and 386i/250 are \$8,490 and \$12,740, respectively.

AT&T, whose Bell Laboratories developed Unix in the early 1970s, has a version of *VP/ix* called *AT&T Simul-Task 386*, Version 2.0, which runs under Unix System V/386, Release 3.2, primarily on AT&T's WorkGroup System (WGS) 6386 and WGS 6386E. Among its enhancements are its ability to run DOS CGA (Color/Graphics Adapter) and text applications in console X11 Windows (X11 Windows is the latest release of the X Window environment) and DOS EGA (Enhanced Graphics Adapter) applications

■ The 386, through its virtual 8086 mode, offers a way to bring the power of DOS to the Unix environment.

in full-screen X11 Windows. In addition, its base Unix menuing environment simplifies DOS access. *Simul-Task 386*, Version 2.0, costs \$695 for an unlimited license, and Unix System V/386, Release 3.2, costs \$795 for an unlimited license.

The Santa Cruz Operation, which makes *SCO Xenix*, one of the most popular Unix variants, offers *SCO VP/ix* running under *SCO Xenix 386* (Versions 2.2 and 2.3). Its enhancements include commands that let you access files on DOS floppy disks and partitions; support for SunRiver's graphics terminal, the PS/2 series of computers, and the PS/2 mouse; menu-driven system administration; the ability to run DOS software in the X Window environment; and the ability to integrate standalone DOS machines and Xenix hosts through *Xenix-Net*. *SCO VP/ix* has a price of \$495 for a one- to two-user license and \$995 for an unlimited license; *SCO Xenix 386* costs \$595 for a one- to two-user license and \$795 for an unlimited license.

Like *VP/ix*, *Merge 386* has also seen its share of enhancements. For example,



QNX[®] vs. OS/2 UNIX

QNX[®]: Bend it, shape it, any way you want it.

ARCHITECTURE If the micro world were not so varied, QNX would not be so successful. After all, it is the operating system which enhances or limits the potential capabilities of applications. QNX owes its success (over 75,000 systems sold since 1982) to the tremendous power and flexibility provided by its modular architecture.

Based on message-passing, QNX is radically more innovative than UNIX or OS/2. Written by a small team of dedicated designers, it provides a fully integrated multi-user, multi-tasking, networked operating system in a lean 148K. By comparison, both OS/2 and UNIX, written by many hands, are huge and cumbersome. Both are examples of a monolithic operating system design fashionable over 20 years ago.

MULTI-USER OS/2 is multi-tasking but NOT multi-user. For OS/2, this inherent deficiency is a serious handicap for ter-

minal and remote access. QNX is both multi-tasking AND multi-user, allowing up to 32 terminals and modems to connect to any computer.

INTEGRATED NETWORKING Neither UNIX nor OS/2 can provide integrated networking. With truly distributed processing and resource sharing, QNX makes all resources (processors, disks, printers and modems anywhere on the network) available to any user. Systems may be single computers, or, by simply adding micros without changes to user software, they can grow to large transparent multi-processor environments. QNX is the mainframe you build micro by micro.

PC's, AT's and PS/2's OS/2 and UNIX severely restrict hardware that can be used: you must replace all your PC's with AT's. In contrast, QNX runs superbly on PC's and literally soars on AT's and PS/2's. You can

run your unmodified QNX applications on any mix of machines, either standalone or in a QNX local area network, in real mode on PC's or in protected mode on AT's. Only QNX lets you run multi-user/multi-tasking with networking on all classes of machines.

REAL TIME QNX real-time performance leaves both OS/2 and UNIX wallowing at the gate. In fact, QNX is in use at thousands of real-time sites, right now.

DOS SUPPORT QNX allows you to run one PC-DOS application at each computer on a QNX network. With OS/2, 128K of the DOS memory is consumed to enable this facility. Within QNX protected mode, a full 640K can be used for PC-DOS.

ANY WAY YOU WANT IT QNX has the power and flexibility you need. Call for details and a demo disk.

THE ONLY MULTI-USER, MULTI-TASKING, NETWORKING, REAL-TIME OPERATING SYSTEM FOR THE IBM PC, AT, PS/2, THE HP VECTRA, AND COMPATIBLES.

Multi-User	10 (32) serial terminals per PC (AT).	C Compiler	Standard Kernighan and Ritchie.
Multi-Tasking	64 (150) tasks per PC (AT)	Flexibility	Single PC, networked PC's, single PC with terminals, networked PC's with terminals. No central servers. Full sharing of disks, devices and CPU's.
Networking	2.5 Megabit token passing 255 PC's and/or AT's per network. 10,000 tasks per network. Thousands of users per network.	PC-DOS	PC-DOS runs as a QNX task.
Real Time	4,250 task switches/sec (AT).	Cost	From US \$450. Runtime pricing available.
Message Passing	Fast intertask communication between tasks on any machine.		



For further information or a free demonstration diskette, please telephone (613) 591-0931.

Quantum Software Systems Ltd. • Kanata South Business Park • 175 Terrence Matthews Crescent • Kanata, Ontario, Canada • K2M 1W8
CIRCLE 192 ON READER SERVICE CARD
Come meet us! COMDEX/Spring '85, April 10-13 • McCormick Place • Chicago, IL • Booth #2843

QNX is a registered trademark of Quantum Software Systems Ltd.

The UNIX Operating System is a registered trademark of AT&T. IBM, PC, AT, XT and PS/2, PC-DOS and OS/2 are trademarks of International Business Machines. HP and Vectra are registered trademarks of Hewlett-Packard Company.

We keep telling people
this is not a laser printer.



The \$995 HP DeskJet Printer.

But they keep looking at the evidence.



Mr. Arnold B. Jones
320 Bush Street, Suite 405
San Francisco, CA 94104

Dear Reader:

Imagine being able to put our merged text and graphics that look so fast, that your clients will think you're using a laser printer. When you're using the \$995 HP DeskJet printer leased.



This is one of many business benefits you can print out on the HP DeskJet printer. A benefit for this text and graphics demonstration by Harvard Graphics.

Sincerely,

Alan Grube
Alan Grube

One reason you can afford so easily to print words with pictures, is because the PC, with your printer is one quick

We call it a great small price.

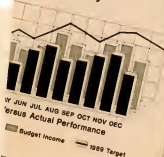
Of course, how good it is to you for your



THE TIGER

Tiger! Tiger! burning bright
here you made my laser light?
No, I'll tell you what made me —
A DeskJet printer (true or?)
(With apologies to William Blake)

MegaCorp 1988 Sales History



You may not believe your eyes, either. The HP DeskJet printer gives you the same crisp, black lettering. And clean, sharp graphics. But it uses advanced ink-jet technology to give you these laser-like qualities for the price of a 24-wire printer.

For just \$995, you get 300 dpi in a trim 15-pound package that sits easily on your desk. It has four built-in fonts, and over 100 optional fonts available in plug-in cartridges. With a 20,000-hour MTBF, it will keep working away for a long, long time. And it will do it all in blissful quiet.

So don't settle for a noisy dot matrix printer. Instead, call 1-800-752-0900, Ext. 296J for a brochure and your nearest authorized HP dealer. Then judge the HP DeskJet printer for yourself.



**HEWLETT
PACKARD**

■ DOS UNDER UNIX

Prime Computer offers *Merge 386* under its own implementation of Unix System V, Release 3.0, running on Prime's EXL Series 386. A fee of \$1,800 will buy you an unlimited license for this DOS-under-Unix program, which offers synergy with *PC-Interface* and supports the PT250 terminal. Convergent Technologies distributes *Merge 386* under CTIX/386, a version of Unix System V, Release 3.0, running on the Server PC series. An unlimited license costs \$1,100; enhancements include a PC-compatible hardware interface. Bell Technologies' *Merge 386* under Unix System V/386, Release 3.0 or 3.2, supports the Blit series of graphics engines and such

■ In Unix, a true copy of DOS runs just as it does on a standard PC, so even an ill-behaved program like a TSR should operate normally.

networking protocols as TCP/IP. A one- to two-user license for Bell's *Merge 386* costs \$295, and an unlimited license costs \$795. A one- to two-user license for Unix System V/386, Release 3.0, costs \$190 (\$295 for Release 3.2), and an unlimited license costs \$290 (\$795 for Release 3.2).

Microport Systems offers *DOS Merge 386*, which runs under Microport's Unix variant, Microport System V/386, Release 3.0e. Highly compatible with Locus's original *Merge 386* program, Microport's *DOS Merge 386* has an advanced driver set as well as doscp, dosdir, and doscat utilities to access DOS diskettes and partitions. *DOS Merge 386* costs \$399 for a one- to two-user license and \$499 for an unlimited license. Microport System V/386, Version 3.0e, costs \$299 for a one- to two-user license and \$598 for an unlimited license.

Unisys markets *Merge 386* under Unix System V (based on Unix System V, Release 3.0), running on the Unisys 6000/50 system. An unlimited license for

this program costs \$1,000. Unisys's offering provides synergy with *PC-Interface*; supports the Unisys UVT 1224G terminal, which consists of a PC-compatible screen and keyboard; and comes with OFIS Ensemble, a program that ensures easy access to the best environment for a particular function, such as Unix for sending mail or DOS for word processing.

FEATURES IN COMMON Enhancements aside, both *VPIix* and *Merge 386* take a similar approach to supplying a DOS-under-Unix environment. With each, the standard Unix environment is still there, with all its commands, capabilities, and complexity. Each product adds one basic command to the Unix repertoire—the command to start up a DOS environment, which is much like booting DOS on a standard PC and takes about as long as a warm reboot. And, of course, both products use the 386 processor's virtual 8086 mode to create the DOS-under-Unix environment, which mimics the hardware architecture of a standard PC.

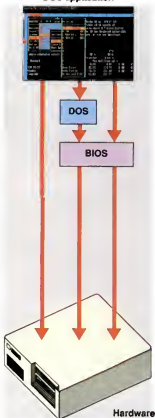
Within that environment, a true copy of DOS executes just as it does on a standard PC, which means that even ill-behaved programs like TSRs should operate normally. A single DOS-under-Unix session will run at a speed comparable to that of DOS running on a 386 machine without Unix. When several DOS-under-Unix sessions are running, you'll see a certain amount of performance degradation. But you will usually be able to maintain AT-level or better performance for each session.

From within the DOS environment, you can enter DOS commands—anything from DIR or TYPE to running your favorite application program. In addition, both DOS-under-Unix products will automatically fire up the right environment to execute whatever command you enter. For example, if you enter Unix's ps (process status) command from the DOS environment, the system will temporarily switch back to Unix, run the ps command, and then switch back to DOS. Similarly, you can enter DOS commands from within the Unix environment. The only drawback to doing so is that your start-up time will be slightly longer than if you were operating in the right environment to start with.



Different Operating Systems, Different Methods

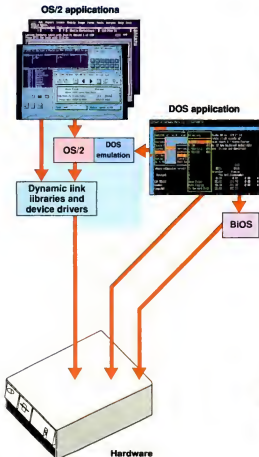
DOS application



The DOS Environment

Whether it's running on an 80286 or 80386 machine, DOS operates the same way. As shown here, the BIOS (Basic Input/Output System) handles the lowest level of services, DOS handles an intermediate level, and the application program is what the user sees. Because there is no memory protection, an application can reach past DOS to access the BIOS directly, or it can even lunge past both to access the hardware.

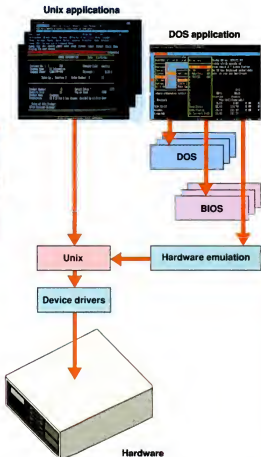
286 Protected Mode



The OS/2 Environment

This diagram shows how OS/2 juggles protected-mode applications plus a single DOS application running in 8086 real mode. OS/2 and the applications written for it operate in the protected mode of the 80286, shown in blue, while the DOS software operates in 8086 real mode. This arrangement allows OS/2 to operate on both 286- and 386-based machines.

386 Protected Mode



The Unix Environment

The Unix approach, which operates only on 80386-based machines, uses virtual 8086 mode for the DOS sessions. The Unix system and Unix applications operate in the protected mode of the 80386, shown in blue. The role of VP/ix and Merge 386 is to create the proper virtual 8086 mode, which involves taking care of two basic chores: emulating the standard hardware that exists on PCs—such as the disk, the keyboard, and the display—and furnishing the BIOS software that DOS and its applications expect. Within each specially crafted virtual 8086 environment, a copy of DOS and a standard application can run as if they were running on an ordinary PC.

■ DOS UNDER UNIX

Another feature common to both programs is the ability to run DOS sessions from a terminal. On standard serial terminals you are limited to running text software; any program that runs on an IBM Monochrome Display Adapter (MDA) should work fine on a terminal. Screen redrawing speeds are slower than for the PC's traditional memory-mapped video adapters, but for many applications a serial terminal works fine.

Both *Merge 386* and *VP/ix* support multiple console sessions; hence you can interact with several separate sessions at the same time, but only if you are using the system console. This feature makes it seem as if you have several separate sys-

■ If all you need is a multiuser DOS system, there are more-efficient and less-expensive solutions than a DOS-under-Unix environment.

tem consoles, each simultaneously running either Unix or DOS software. You switch from one session to another using a special hotkey.

Also important is the fact that both programs support DOS-to-Unix and Unix-to-DOS pipes. Pipes—one of the Unix system's key features—lets you route the output of one program to the input of a second, so that the two can operate synergistically. For example, you can count the number of users on a system by piping the output of Unix's *who* (display list of users) command to the *wc* (word count) command. By allowing pipes, *VP/ix* and *Merge 386* let you create hybrid programs that bridge DOS and Unix.

A REALITY CHECK While DOS-under-Unix software can run most of the DOS applications software library, it won't run all of it. For example, applications like *Windows/386*, *DESQview 386*,



DOS Environments that Run Under Unix: Summary of Features

(Products listed in ascending price order)

The two DOS environments reviewed here have many features in common. Each of them will

- support both CONFIG.SYS and AUTOEXEC.BAT, systemwide, per user, or per session;
- access communications ports COM1 and COM2;
- access floppy disk drives A: and B:;
- access one DOS partition per hard disk drive;
- boot software on a DOS floppy disk;
- support multiple sessions on the system console;
- support the IBM high-order character set, the PC keyboard, and graphics applications, on the system console;

- access Unix partitions and permit Unix filename mapping;
- execute Unix commands from the DOS environment, and vice versa;
- provide Unix-to-DOS and DOS-to-Unix pipelines;
- convert Unix text files to DOS format, and vice versa.

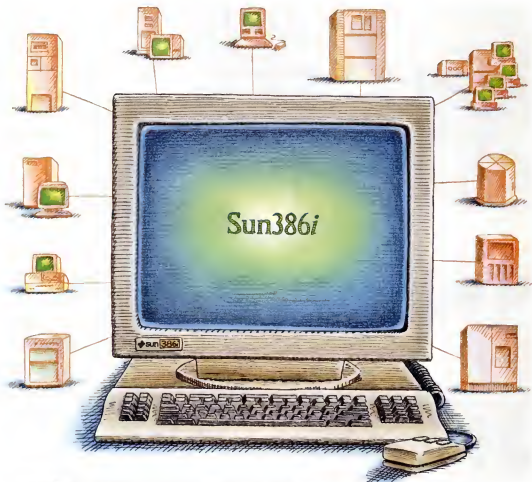
Other features are plotted in the table.

	Merge 386 Win Unix: \$795 (2 users), \$1,595 (unlimited)	VP/ix Win 386/ix operating system and TEMPLUS user interface: \$695 (2 users), \$1,395 (unlimited)
DOS ENVIRONMENT		
DOS version supplied	3.21	3.3
DOS versions supported	3.3, 3.2, 2.x	3.3, 3.2, 2.x
Additions to DOS commands	merge, printer, unix2dos, dos2unix, udir, on, quit	rununix, unixpath, dospath, rdir, lrf, dosmount, quit
Supports expanded memory	○	●
Floppy disk densities supported	360K, 720K, 1.2MB, 1.44MB, virtual	360K, 720K, 1.2MB, 1.44MB, virtual
Mouse support		
Serial	●	●
Bus	●	●
Microsoft InPort	●	●
PS/2	○	●
Graphics support		
CGA	●	●
EGA	●	●
VGA	○	●
6514	○	○
Hercules	○	●
Handling of hung applications		
Exits DOS session	●	●
Starts new DOS session	○	●
UNIX FEATURES		
Disk space required to install DOS environment	2.5MB	2MB
Recommended memory per DOS session	1MB	1MB
New Unix commands	dos, newdos, doscpit, dosadmin, dosboot, dos2unix, unix2dos, newunix	ygsl, shell enhancements
Remote terminal support	DEC VT-100, HDS 200, TeleVideo PC81, WYSE WY-60 (any ASCII terminal)	DEC VT-52, VT-100; LINC 3, LINC 6; SunRiver terminals; WYSE WY-60
Supports IBM's high-order character set on		
SunRiver graphics terminal	○	●
PC Scancode terminals	○	●
Standard terminals	○	○
Supports PC keyboard on		
SunRiver graphics terminal	○	●
PC Scancode terminals	●	●
Standard terminals	○	○
Supports graphics applications on		
SunRiver graphics terminal	○	●
PC Scancode terminals	○	○
Standard terminals	○	○

● — Yes ○ — No

OS/2
promises
you
the moon.

But it'll ne everything u



© 1989 Sun Microsystems, Inc. Sun386i, Sun and Systems for Open Computing are trademarks and Sun Microsystems and the Sun Logo are registered trademarks of Sun Microsystems, Inc. UNIX is a registered trademark of AT&T. All other products or services mentioned are identified by the trademarks of their respective organizations.

ver give you nder the Sun.

You're looking at a total eclipse of the moon.

Namely, the Sun386i™ workstation. Whatever OS/2 does, the Sun386i with UNIX® does better.

Which is not a pie-in-the-sky promise, but a down-to-earth fact.

While the OS/2 operating system limits your network horizons primarily to fellow PCs, the UNIX operating system on the Sun386i opens them to the world.

Mainframes, minis and personal computers of every shape and size.

So not only can you save all the IBMs, DEC's and Apples you've ever bought, you can effectively tie them all together right on your desk.

And if that's not enough to make you thank your lucky stars, there's this:

You don't have to give up one bit of DOS.

In fact, you can make more out of it.

Whereas with OS/2, you can run just one DOS program at a time. With the Sun386i's multitasking, you can run all sorts of DOS and UNIX programs at the same time.

Say you're working on currency trading figures under UNIX, you can update your Lotus® 1-2-3® spreadsheet under

DOS. Make a Harvard Graphics™ slide show under DOS. Cut and paste results of all three into a sophisticated publishing package under UNIX. And E-mail it to the coast.

Simultaneously.

Far out, you say?

Not really. Well within reach.

Because you can forget the UNIX hieroglyphics of yesteryear. The Sun386i, with its point-and-click interface and Hypertext help system, is easier to use than most any personal computer.

And it'll no longer take you a sidereal year to figure out how to plug into your corporate network. In this solar system, it's a 30-minute job.

After all, the Sun386i is just part of Sun's concept of Open Computing. A corporate-wide universe of truly distributed computing based on industry standards. Something out of sight for OS/2.

Which just goes to show you.

Once you look at the moon, you'll see how much the Sun really shines.

To find out more, phone 1-800-223-6736. In California 1-800-322-6736.



Systems for Open Computing.™

PSL Computer Products

1-800-2424-PSL

Specially selected computer products at special prices.

GENERAL:

PPS:First Publisher	\$ 69.95
WordPerfect 5.0	\$224.95
Deskview 2.2	\$ 74.95
Microlytics 4.0	\$ 37.95
Graph-in-the-Box	\$ 69.95
ComputerShare Membership	\$ 24.95
Covox Speech Synthesizer	\$ 54.95
Covox Voice Digitizer	\$ 90.95

EDUCATION:

Math Blaster Plus	\$ 28.95
Reader Rabbit	\$ 21.95

GALES:

Mean-18 Golf	\$ 24.95
MS Flight Sim. 3.0	\$ 33.95
Falcon-AF	\$ 33.95
3D Helicopter	\$ 31.95
Leisure Suit Larry	\$ 25.95
Leisure Suit Larry II	\$ 31.95

PROGRAMMING:

Norland Turbo C	\$ 89.95
Norland Turbo Pascal	\$ 89.95
Turbo Assembler	\$ 89.95
MS QuickBASIC 4.5	\$ 67.95
BOOK: Glosbrenner's Guide to Free Software (With \$100 of coupons)	\$ 15.95

NOTICE: The above prices reflect a 4% cash discount. Allow 10 days for personal checks. Non-U.S. orders: MC/VISA only. S&H: \$4 or actual if by MC/VISA.

SHAREWARE from the Public (Software) Library

Buy for the price shown (plus S&H or try before buying for \$5 per disk)

Checkmate General Ledger	\$ 40
DataCat - fast, easy mail list manager	\$ 25
EL Project - project manager	\$ 48
Fantasticks home budgeting	\$ 48
LIST - Burger's file viewer	\$ 15
Medlin Accounting - g/f, acct. receiv., payroll, payables	\$140
My-Desk - 7x pop-up editor, calendar, calc., etc	\$ 49
Hewkey - keyboard macro pgn.	
PCW's Editor's Choice	\$ 43
PC-File:ids - dBase compatible but easy to use!	\$ 90
PC-Key-Draw - powerful CAD plus HyperDraw linking	\$100
QuebecCalc - 3D spreadsheet pgn	
PC Mag Editor's Choice	\$ 70
TesSeRact - TSR routines for programmers.	\$ 40

More Shareware to try for \$5/disk:

Word Perfect 5 Enhancements - Macros; 2 disks full	\$10
- Utilities for WP5	\$ 5
- Art image files for WP5	\$ 5
Mean-18 Courses (5 disks)	\$25
LE LaserJet soft fonts - lots of fonts & utils.	\$ 5
Amortization & Fin. Analysis	\$ 5
Calendar-Making Program	\$ 5
MS Lists - 100's of BUS #'s	\$ 5
Clip-art for Printmaster	\$ 5

PSL NEWS - the only major monthly magazine all about pc/shareware. \$18/yr. Call/write for free copy.

P.O. Box 35705
Houston, TX 77235-5705
1-713-665-7017 for info
1-800-2424-PSL to order

CIRCLE 529 ON READER SERVICE CARD

DOS UNDER UNIX

Paradox 386, or OS/2, which try to go into the protected modes of the 286 or 386, will definitely not work. The Unix system has already usurped that privilege. Other potential problems are:

■ Applications that perform extensive low-level access to PC hardware. Most PC software does a good job of emulating hardware, but sometimes problems arise when an application bypasses the operating system to talk directly to the hardware.

■ Applications that are timing-sensitive. Timing is not very predictable in a multiuser environment. Similarly, applications that generate a high interrupt rate may not work well.

■ Applications that perform low-level access to the DOS file system. DOS-under-Unix software primarily uses the Unix file system, which doesn't have the standard DOS directory structure or DOS's File Allocation Table, among other things. Usually this doesn't cause a problem because most programs use DOS file I/O calls. Exceptions are DOS file system repair or enhancement programs. The Unix system has its own utilities for file system repair.

In addition, you'll need to check with prospective vendors to see whether their systems will support such devices as communications boards, networking boards, tape controllers, and data acquisition boards, for which DOS drivers exist.

THE BOTTOM LINE If all you need is a multiuser DOS system, there are more-efficient and less-expensive solutions than a DOS-under-Unix system. If you need a multiuser, multitasking DOS system and you also have a compelling need for Unix, or if your primary operating system is Unix and you need access to the large base of sophisticated DOS applications, then you should think seriously about bringing in a DOS-under-Unix program. If you already use a version of Unix on your 386 machine, the choice of which DOS-under-Unix product to buy has probably already been made for you: some Unix vendors support only *VPix* or a specific variant, some support only *Merge 386* or a specific variant, and some don't support either. But if you are thinking about a move to Unix, you should carefully consider whether you want to run *VPix* or *Merge 386*, then choose your Unix software accordingly.

Merge 386

Merge 386, from Locus Computing Corp., is a highly configurable DOS-under-Unix system. It works solidly, has many options and configuration possibilities, and is a good performer. But *Merge 386*'s chief advantages—its flexibility and configurability—are also weaknesses: you must work hard to make it run the way you want. In addition, *Merge 386* lacks some of the amenities that DOS users have come to expect, such as support for VGA (Video Graphics Array) graphics and EMS (expanded memory specification) memory.

Running under Bell Technologies' Unix, *Merge 386* is delivered with DOS 3.21. A license for one or two users costs \$695, and an unlimited license costs \$1,195. Furthermore, you can even install your own version of DOS if you prefer: in addition to Version 3.21, the program supports DOS 3.3, 3.2, and 2.x. Like *VPix*, *Merge 386* works best with about 1MB of memory available for each active session, in addition to the 2.5MB memory required for the host Unix system. Also like *VPix*, *Merge 386* lets you run more tasks than will fit in memory, but with some performance degradation. Unlike *VPix*, however, *Merge 386* can be configured to create a DOS environment containing less



FACT FILE

<ul style="list-style-type: none"> Merge 386 (user's manual) Locus 	<p>Merge 386 Locus Computing Corp. 9880 La Cienega Blvd. Inglewood, CA 90301 (213) 670-6500</p> <p>List Price: Without Unix operating system, license for one or two users, \$695; unlimited license, \$1,195. With Bell Technologies' Unix: license for one or two users, \$795; unlimited license, \$1,595. PC/Lib: \$995.</p> <p>Requires: 2.5MB RAM, 30MB hard disk (DOS 3.21 included).</p> <p>In Short: A highly configurable and flexible DOS-under-Unix environment designed for multiuser systems under heavy load. Not copy protected.</p> <p>CIRCLE 424 ON READER SERVICE CARD</p>
--	---

Make expert business forecasts in minutes— with Lotus® and TrendSetter Expert™.

Business forecasts drive business decisions. Better forecasts mean better decisions.

How many units will be sold?
How many parts to order? How many assemblies to manufacture?
How high will expenses be? How many students will register? How many rooms will be rented? How much cash will be needed? How do you know?

You can hire a forecasting expert. A statistician who may use Auto-correlation, Brown's Double Exponential Smoothing, and Linear Regression Analysis. And then apply experience and judgment to arrive at your forecast. In a day, or maybe a week. For \$100 an hour.

Or you can buy a forecasting expert. The TrendSetter Expert. It does the same thing. In minutes. For \$149. Period.

Make expert business forecasts. Verify forecasts made by others. In four easy steps.

Start with history data, such as monthly sales for the last two years, on a Lotus 1-2-3® or Symphony® worksheet. Then invoke the TrendSetter Add-in, and:

- ① Show TrendSetter where your data is,
- ② Tell it how far in the future to forecast,
- ③ Show it where to put the results, and
- ④ "Go".

TrendSetter puts results directly on your worksheet, showing upper and lower bounds for the forecast plus other measures of statistical accuracy. The manual explains what they mean. You can easily modify forecasts with Lotus to reflect your own judgment. TrendSetter even writes Lotus macros so you can graph your forecasts at the press of a key.

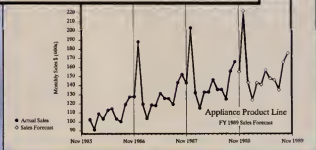
That's it! With Add-in convenience.

TrendSetter Expert makes consistently better forecasts. Here's how.

TrendSetter Expert uses time-series extrapolation techniques to forecast future values based on the past. Proprietary expert-systems logic examines the history data and combines several sophisticated statistical analysis techniques to produce the forecast. TrendSetter Expert even allows for seasonality to accommodate, for example, yearly holiday sales peaks.

Just how good are TrendSetter Expert forecasts? Superlative! In a widely respected forecasting competition, 24 different forecasting methods were pitted against 111 sets of diverse real-world data. Using the same data, TrendSetter produces more accurate forecasts for 50% of the test cases, and better than the average for the rest! (Details available on request.)

Series Type	Month	Date	Forecast	Upper	Lower	S. Factor
First Actual	1	Nov 1985	158	158	155	1.03
Confidence		Dec 1985	221	221	217	1.48
Level	98.08	Jan 1986	143	143	139	0.95
Interval	3	Feb 1986	126	126	116	0.82
Mean	120	Mar 1986	143	143	137	0.84
Std Deviation	24	Apr 1986	147	148	139	0.92
Minimum	81	May 1986	197	184	150	1.01
Maximum	203	Jun 1986	147	155	140	0.84
Trend Line Slope		Jul 1986	146	154	138	0.83
Entire Range	1.26	Aug 1986	195	144	127	0.88
Least Half	0.88	Sep 1986	168	174	157	1.04
Seasonality		Oct 1986	178	185	168	1.10
Auto()	12					



Satisfaction guaranteed, or your money back!

Don't misunderstand. No forecasting method is perfect. But TrendSetter Expert will help you make better forecasts than you do today. Guaranteed. Or your money back.*

So don't wait! Make an expert business decision right now. So you can make expert business forecasts in the future. Buy TrendSetter Expert.

Only \$149!

To order, or for more information and the name of the dealer nearest you, call:

800-325-9035

In Mass., call 508-366-1122.

*If you aren't satisfied for any reason, return TrendSetter for a refund (if purchased directly from Concentric or an Authorized Reseller). TrendSetter Expert works as an Add-in with 1-2-3 Releases 2 and 2.01, and with Symphony Releases 1.1 and 2.0 on IBM® PCs and compatibles with PC-DOS 2.1 or later and a hard disk 5.25" and 3.5" diskettes included.

Another timesaving tool from the authors of R&R Relational Report Writer® for dBASE® and R&R Worksheet Report Writer™ for Lotus.

TrendSetter™ EXPERT

Concentric Data Systems, Inc.
18 Lyman Street, Westboro, MA 01581

EXTENDING THE VIRTUAL 8086 ENVIRONMENT

Emulating the standard hardware/BIOS environment of a PC using the 80386 processor's virtual 8086 mode is no small feat, but it's necessary if you want your DOS-under-Unix system to be able to use the slew of peripherals and facilities—scanners, networks, mainframe communications, graphics tablets, joysticks, trackballs, and others—that are part of the PC's everyday environment. None of these are emulated in the standard *VPix* or *Merge 386* environments, but they can be accommodated by extending those environments.

The first level of support offered by both products allows a DOS session direct access to a device on the PC bus. In *Merge 386* parlance, this is called DDA (direct DOS attach). In *VPix*, it's also called DDA, but it stands for "direct device access." In both cases, DDA lets a single DOS session use a hardware device that isn't in the standard set of supported devices.

When you use DDA, the virtual 8086 environment is set up so that accesses to the device's addresses go directly to the device, just as if the program were running in real mode on a standard DOS system. This happens even as all other accesses to "standard" hardware addresses go to emulated devices rather than directly to the bus. Interrupts by DDA devices

activate a generic Unix interrupt handler, which relays each interrupt into the proper virtual 8086 session.

The big advantage of DDA is that it is easy to use. (Both Locus Computing and Interactive Systems report that a sizeable number of their users are working with DDA.) You just specify the I/O ports, memory addresses, interrupt vectors, and DMA (direct memory access) channels that are used by the device in question; then you ask to use that device when you are starting a DOS session. *VPix* and *Merge 386* have similar capabilities in this area, except that only *Merge 386* supports DMA.

VPix and *Merge 386* also allow you to create drivers for specialized devices such as network interfaces. This process is much more complicated and expensive than DDA, and you need a talented systems programmer to write the code. For the most part, this step is taken by OEMs and system integrators to meet the needs of a large client base. Few end users, if any, write device drivers.

Although it takes a lot of talent and effort to write device drivers, these tools have several advantages. With a device driver, you can field interrupts more rapidly and with less overhead than when you use DDA interrupt handling. Another advantage is that some devices, such

as network interfaces, can be shared by multiple DOS sessions if they are accessed through a device driver. (When they are accessed through DDA, only one session at a time can use the device.) And with *VPix*, you must use a device driver to interface to a device that uses DMA data transfers. (*Merge 386* can handle many such devices with DDA.) *VPix* comes with all you need to create a device driver, whereas Locus recommends that you contact its technical support staff and work closely with them if you choose to create one.

Another approach to extending the environment involves developing programs that bridge the chasm between DOS and Unix. With *Merge 386*'s PCILib facility or *VPix*'s Channels facility, you can write a distributed application—for example, a DOS user interface program that uses a Unix database server. PCILib costs \$995; Channels is included with the *VPix* package.

DDA lets DOS sessions access unusual hardware. Device drivers, while more demanding to create, let you manage more hardware, more efficiently. Both *Merge 386* and *VPix* offer software libraries that let you gain mastery over distributed applications. Both products cover the bases and the turf in between.

—Kaare Christian

than 640K of RAM, which reduces the strain on system memory.

The documentation that comes with *Merge 386* contains all the information you'll need—but don't expect light reading. Although the program's installation procedure is so easy to follow that you probably won't need to consult the manual, you will have to slog through it to configure and tune the program.

The documentation consists of a thick manual that deals with Version 1.0 of the program, plus a skinny booklet for Version 1.1. Don't make the mistake of overlooking this second pamphlet; Version 1.1 includes a lot of important enhancements you'll want to know about. It would be

more helpful if Locus provided one unified manual that covered all the bases.

Merge 386 lets you run most DOS commands from the Unix environment and most Unix commands from the DOS environment. True to its name, it merges two worlds, allowing you to install new software that will be accessible from both and to create pipes from one environment to the other. By default, both environments use the Unix file system. If you have a DOS partition on your hard disk, it is accessible only to DOS software.

Merge contains a screen-switch utility that lets you sequence from one active session to another. Although serial-terminal users can run only one session at a time,

console users can run multiple DOS and Unix sessions, conveniently switching from one to the other.

A COMFORTABLE SETUP When *Merge 386* starts to run, the program assigns the C: drive to the Unix file system. COMMAND.COM and CONFIG.SYS files exist in the Unix root directory, just as they would in the root directory of a standard DOS C: drive. I liked this arrangement because the C: drive is the place to be when you're running DOS. You can also put your personal AUTOEXEC.BAT and CONFIG.SYS files in your home directory, executing them in addition to or in place of the systemwide files stored in the

Finally, dBASE® and Lotus® have something in common.

Database reports without programming— with R&R report writers.

R&R helps you create reports quickly, without programming, directly from related databases. Use for turnkey systems and ad hoc reporting. Print in any layout, from columnar listings and mailing labels to preprinted forms and form letters. R&R is full-featured and flexible, so you can concentrate on making reports show exactly what you want to show, in exactly the way you want to show it. Any report.

Perform calculations as needed, including totals and subtotals. Sort and group records in any order. Select records with plain-English query. Save time with automatic TRIM, word-wrap, justification, currency, and date formats. Improve appearance with bold, italics, underline, different fonts, and graphics characters.

Lotus-like menus, WYSIWYG screen-painting, and HELP system make it easy to learn R&R. And since R&R report writers look alike, when you've learned one you know them both.

R&R Relational Report Writer™

Works with dBASE III, dBASE IV, dBase™, Quicksilver™, and file-compatibles. Includes royalty-free runtime that requires only 25 KB of memory. Network support standard. Clipper™ and FoxBASE™ Module required for .NTX and .IDX indexes, \$49.95.

For
dBASE III®
and
dBASE IV™.
\$149



"... a stunning combination of a comfortable and informative user interface, supremely easy access to multiple related files, and extensive report design and enhancement tools. Usable by novice and expert alike, it is superb for generating either straightforward or complex report output..." 12/8/87.

One of "The 100 Top-Rated Products of 1987."
InfoWorld, 12/28/87.



Awarded Most Useful Add-On Product for dBASE by 1988 dBASE Developer Conference attendees. Ashton-Tate, September 1988.

R&R Worksheet Report Writer™

Works with Lotus database worksheets or ranges. Works as add-in or add-on with 1-2-3, Symphony, and worksheet-compatible products. Requires 20 KB as add-in. Network support standard. Replaces Lotus 1-2-3 Report Writer™, and includes program to convert existing reports to R&R.

For
Lotus 1-2-3®
and
Symphony®.
\$149

R&R report writers—
the standard for database reporting!

30-Day Moneyback Guarantee!

CIRCLE 113 ON READER SERVICE CARD
To order, or for more information and
the name of the dealer nearest you, call:

800-325-9035

in Mass., call 508-366-1122.

Concentric Data Systems, Inc.

18 Lyman Street, Westboro, MA 01581

23340	06/04/88	Adult Property	00210	15.00
23340	06/04/88	Full Mouth X-ray		
	06/15/88	Check #428		55.00
23447	06/15/88	Silver Amalgam 02120		
		Tooth #12		
23447	06/15/88	Silver Amalgam 02120		55.00
		Tooth #13		

Sales
Registers
Invoices
Form Letters
Statements
Mailing
Labels
Aged
Receivables
COD Tags
Purchase
Orders
Customer
Lists
Telephone
Directories
Sales
Analyses
Advertising
Schedules
and more

BRINGING DOS COMPATIBILITY TO NON-80x86-BASED SYSTEMS

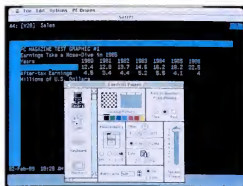
If you need to run a DOS application on a non-80x86-based machine, you can effect DOS compatibility by using one of two programs: Hunter Systems' XDOS or Insignia Solutions' SoftPC.

Like it or not, if you use non-DOS hardware, you might occasionally need to run a DOS program. You may receive a file in a format that's not readable by any program native to your system; you may have to run a program that was developed in-house under DOS and cannot be readily translated; or you may simply need to run a corporate standard like *Lotus 1-2-3*, *DisplayWrite*, or *dBASE III Plus*.

On non-DOS systems that use 80x86 processors, programs like Interactive Systems' *VPIix* and Locus's *Merge 386* can provide DOS compatibility through the processor. But systems based on different architectures require more complex solutions. The most obvious answer is to put an 80x86 processor on a card and transfer program execution to the card. This is the approach AST Research took with its AST Mac286 card for the Macintosh II. This add-in board gives true 80286 instruction-set compatibility to the Macintosh, but at substantial expense and with a loss of integration.

The less-obvious answer is to effect DOS compatibility through software. And that's just what Insignia Solutions (based in Sunnyvale, Calif.) and Hunter Systems (Mountain View, Calif.) are doing with their respective programs *SoftPC* (\$595 for the Macintosh II and SE) and *XDOS* (\$325 to \$975 for Unix-based machines).

In addition to the Mac II and SE,



SoftPC, \$595 from **Insignia Solutions**, emulates the Intel 8088 through software, thus enabling a Macintosh II or SE to run any DOS application.

SoftPC supports the Sun 3, the HP 9000 Series 800, the Tektronix 4200 and 4300, and the Intergraph Clipper chip running on the Interpro 32 or 34. Among the systems that *XDOS* supports are the Sun 3, the Apollo, the NCR Tower, the Motorola 8000, the Acer Counterpoint, the Sony NEWS workstation, and the Hewlett-Packard 9000. You can call Insignia Solutions at (408) 522-7600 and Hunter Systems at (415) 965-2400.

The approaches taken by *SoftPC* and *XDOS* differ from the start. *SoftPC* allows you to run any off-the-shelf DOS application without modification by emulating the Intel 8088. With *XDOS*, however, you recompile 80x86-based programs, optimizing them for the new environment.

INVISIBLE TRANSLATIONS *SoftPC's* designers believe that translations should be transparent to the user. Insighnia has made a theatrical move: when you launch the Macintosh version of *SoftPC*, it greets you with the simulated sound of a floppy disk drive head moving and a beep—the familiar sounds of an IBM PC-XT booting up. From then on, its simulation of the DOS environment is almost perfect.

SoftPC makes several concessions to hardware differences. You can make the built-in mouse emulate a Microsoft Mouse, and if you have Apple's external 5¼-inch drive or the DaynaFile, you can define it as the A: drive. The next major release, which should be out by the time you read this, will support Apple's new

root directory. Drive D: accesses your home directory, and drive E: accesses the DOS partition, if there is one, on your hard disk. Most people will find this a comfortable and comprehensible setup.

A host of options let you fine-tune

Merge 386's performance. Version 1.0 featured the `dosadmin` and `dosopt` commands, which are designed for tailoring the default operation of *Merge*. These commands let you specify the amount of memory used, the default console screen

type, printer operations, the attachment of special devices to your session, and the use of systemwide or user-specific CONFIG.SYS and AUTOEXEC.BAT files. Version 1.1 adds the Merge command, which is designed to manage new 1.1 on-

3½-inch Smartdrive, allowing access to 3½-inch IBM floppy disks on machines equipped with it. Every DOS program we tested would run straight out of the box when used with this program.

While *SoftPC*'s simulation of an 80x86-based DOS environment seems ideal, it comes with a severe performance penalty. On a 16-MHz 68030-based Macintosh IIx—the fastest machine that Apple makes—*SoftPC* takes roughly 1.2 times as long as an IBM PC AT or PC-XT. While this is acceptable for occasional use, you'll waste a phenomenal amount of processing power if running DOS applications represents a substantial amount of your computing time.

PERMANENT CONVERSION

Where *SoftPC* simulates the 80x86 processor, allowing existing DOS programs to run unaltered, *XDOS* permanently converts them to 680x0-based binary code. This approach has two advantages. Performance is much better than could be achieved through software emulation, since there is little overhead introduced by the simulation at runtime. And since you are using a native Unix program, you have full access to the Unix system's memory, disks, peripherals, and multitasking abilities.

XDOS handles basic differences between the DOS and Unix environments in the translation. A runtime module on the Unix system handles environment-

specific issues like video calls. In the recompilation, these activities are directed to routines in the runtime module, which differs from one implementation of Unix to another. Since the recompiled core program accesses these routines in the same way no matter what the system, the program is the same for any Unix implementation you run it on. Support for additional environments is achieved by simply replacing the runtime module. Hunter Systems readily admits that performance will be 70 to 90 percent as efficient as the same program rewritten from the bottom up for the new system.

So you're sold; how do you get *XDOS* and how much does it cost? At present, this is the biggest catch. If you want to run popular DOS applications that *XDOS* already supports, such as *Lotus 1-2-3*, *dBASE III Plus*, *WordPerfect*, *Microsoft Word*, *AutoCAD*, and *Ventura Publisher*, then *XDOS* is a solution you can use today. Hunter Systems can supply you with the tools necessary to convert existing copies of your DOS programs into Unix versions. But if you want to convert an unsupported third-party program or one developed in-house, it won't be that easy. Hunter Systems would rather make royalty arrangements with software manufacturers than let its tools loose on the world. It does not provide *Analyzer*, which determines recompilation strategies, to the public. In time, it may offer this program for lease only. Among new

applications, this will probably limit its usefulness to major operations.

If you want DOS, with its familiar prompts and utilities, on a non-80x86 system, *SoftPC* is a good solution that doesn't require the addition of hardware. *SoftPC* will also deliver what you need if you occasionally want to run a DOS application, or if you want to run a program that was developed in-house, and speed is not particularly important. With *SoftPC*, you should be able to run any DOS application—even RAM-resident utilities and programs that use disk-based copy-protection schemes.

XDOS, on the other hand, will let you apply almost full system power and function to DOS applications by recompiling them as Unix applications on non-80x86 systems—but only if they are currently supported by *XDOS*. If you want to run homegrown applications or those that are not on the supported list, then *XDOS* cannot help you, at least not at this time.

Of course, if you are using a system that is not 80x86-based and you want to run a variety of DOS utilities and programs often, then something is wrong with your basic setup. You are best off investing in a secondary system that runs DOS, or else switching to alternative programs available in your native environment.—Philip F. H. Rose

Philip F. H. Rose is a project leader at PC Labs.

tions; you can set the DOS clock rate to 1 tick per second or the standard 18 ticks per second, and you can force applications that open the keyboard to sleep, thereby boosting performance for other system tasks.

Although commands like these afford

us great control over our software, naturally we want the defaults to work most of the time. After all, a DOS-under-Unix product should boot up DOS and run DOS programs with no hassles. My first frustration with *Merge 386* came when I tried to run

the PC Labs benchmark tests and found that some of the timing results were skewed. This occurred because, by default, *Merge's* DOS clock ticks just once per second, not 18 times as in a normal DOS machine. (Since most DOS software

LITTLE PRICE.

\$89.95

BIG WALLOP

If you're looking for an easy-to-use database that's compatible with dBASE, you've found it.

It's manu-driven PC-FiledB, the database for a little price that packs a very big wallop.

Just for grins try mail merge, report writing, quick labels, advanced graphing, macros and LAN support on for size.

Then add compatibility with dBASE III Plus or dBASE IV databases.

That's a lot for \$89.95.

So see your dealer today. For once it's the program that'll knock you out, not the price tag.

For the name of the dealer nearest you, call 1-800-JBUTTON. (In WA state 206-454-0479.)

ButtonWare

ButtonWare, Inc., P.O. Box 96058, Bellevue, WA 98009, 206-454-0479.

When ordering directly from ButtonWare please add \$5.00 for shipping and handling.

PC-File is a trademark of ButtonWare, Inc. dBASE III Plus and dBASE IV are registered trademarks of Ashton-Tate, Inc.

■ DOS UNDER UNIX

is not sensitive to the clock tick rate, this isn't a major problem. But it does illustrate Locus's philosophy: Performance comes before convenience.) If you encounter a similar problem, don't look in the manual for the solution; it's described only in the Version 1.1 Release Notes.

A JUDGE'S DECISION Locus Computing claims that *Merge 386* is the DOS-under-Unix performance champ. The claim is based partly on how the vendor wrote the software and partly on the many configuration options that let you tune the environment for your software. PC Labs' multitasking benchmark tests do suggest an edge for *Merge 386*, but this is definite-

■ PC Labs' multitasking benchmark tests suggest an edge for *Merge 386*, but this is definitely a judge's decision, not a knockout.

ly a judge's decision, not a knockout.

We tested *Merge 386* running under Bell Technologies' Unix System V, Release 3.0, on a Compaq Deskpro 386/20 with 7MB of memory and a 60MB disk. What did we find? When just one task is active, *Merge 386* is significantly ahead on I/O (DOS File Access tests), but both programs clock in at about the same speed when performing computationally intensive operations (80386 Instruction Mix and Conventional Memory tests). Both programs slow down as background jobs put a load on the system; overall, *Merge 386* remains slightly ahead in both computational and I/O efficiency.

Merge 386 gives you three options for graphics on an EGA console: CGA graphics, EGA graphics, or Fast EGA graphics. Support for VGA graphics is sorely lacking. In its ordinary EGA graphics mode, *Merge 386* is pretty slow and would probably frustrate people who are used to the fast

video speeds of 386 machines. But *Merge 386* speeds up significantly in Fast EGA graphics mode, outperforming *VPix*. The problem with this mode is that you lose the screen-switching ability on the console, which is the key to working with the system from the console.

In further testing, a remarkable finding was connected with *Merge's* video performance when using a serial terminal. The internal mechanism involved looks for changes in a virtual screen buffer that the system maintains. PC Labs' video benchmark tests are analogous to political speeches: they repeatedly write the same thing to the screen. Because *Merge* is looking for changes, it sends little information down the slow serial line to the terminal, thereby producing winning but terribly misleading numbers. Normally, *Merge's* video display speeds would be comparable to those of *VPix*, because real applications don't just idly redraw the screen.

COMPATIBILITY TESTS The standard harbingers of doom for nonstandard PCs—*Lotus 1-2-3*, *Microsoft Flight Simulator*, *Microsoft Word*, and *Microsoft Windows*—worked fine in the *Merge 386* environment. *1-2-3* and *Word* worked both on the console and on serial terminals. The trouble with both *Windows* and *Word* on the console was speed. Both seemed pretty sluggish when I used the standard EGA mode, but I was very reluctant to use the Fast EGA mode because I value the program's screen-switching function.

I encountered an impasse in trying to run *DESQview*, Version 2.0. At each attempt the opening screen appeared, followed by an ugly "Divide by zero" message, which hung the DOS session. I tried several of the *Merge* options but couldn't get around this problem. *Merge 386* leaves little reason to run pseudo-multitaskers like *DESQview*, but it should still be able to handle them.

Overall, *Merge 386* is a reliable performer with a wide variety of hooks and controls that are great if you're looking for a program with a high degree of flexibility and configurability. But you must work hard to gain these benefits, sometimes having to think about your operating environment when you'd rather be thinking about the task at hand.

Easy.

Powerful.



Why Compromise?

The choice is yours...

FormWorx®

Create Custom Forms. With FormWorx you can *easily make any form*...soon after opening the package! Intuitive pull-down menus and clear documentation help you customize one of the many generic forms provided. Or you can start from scratch. Either way, your business forms will truly look business-like using FormWorx, the only program in its price range that lets you easily mix multiple fonts and type in between single-spaced lines.

FormWorx with Fill & File™

FormWorx with Fill & File does everything FormWorx does plus it lets you...

Fill Out Pre-printed and Custom Forms. Simply tab from blank to blank and fill any form right on screen. Entries go exactly where they belong! Print just the data onto standard, pre-printed forms, or form and data together onto blank paper. On laser and dot matrix printers. The program even does math!

	FormWorx 2.0	FormWorx 2.0	FormWorx 2.0	FormWorx 2.0	FormWorx 2.0	FormWorx 2.0
Creates custom forms.	●	●	●	●	●	●
Fill out pre-printed and custom forms.			●	●	●	●
Search across dBASE files directly.						●
Does math.		●		●	●	●
Programmable Automates forms processing.					●	●
List price.	\$85	\$95	\$149	\$195	\$279.95	\$149

Choose FormWorx or FormWorx with Fill & File. But don't settle for anything in between.

Read/Write dBASE® Files Directly. Fill & File is the only forms program that allows you to *re-use your data with any form*. If you've typed it once, why type it again? Up to 4,000 characters per field. 128 fields per record. 32,000 records per file! No need for all those cumbersome file cabinets cluttering your office space!

Automate Forms Processing. Only Fill & File is programmable allowing you to create custom menus and insure standardized forms completion. So, your staff can fill out forms without ever having to know the software. It saves them time and you money.

So Why Compromise?

FormWorx is the easiest form maker around. And FormWorx with Fill & File is the most comprehensive forms processor. New! Both packages now contain over 70 generic forms, exceptional manuals, pop-up calendar and calculator. **Don't settle for less.**

See your dealer immediately or phone today for fast delivery!
800-992-0085 or 617-890-4499

FormWorx®
CORPORATION

Reservoir Place, 1601 Trapelo Road, Waltham, MA 02154

30-day money back guarantee on direct purchases. When ordering by mail, include \$6.75 for shipping in U.S. and Canada. Air mail to Europe/So. America—\$18. All other locations—\$28. In Mass. add 5% sales tax. Purchase orders accepted from government agencies, institutions, and noted corporations. FormWorx is a registered trademark and FormWorx with Fill & File is a trademark of FormWorx Corporation. All other trademarks acknowledged.

FINALLY!

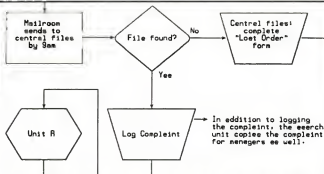
EASYFLOW

An on-screen flowchart processor that knows about flowcharts - not just another "screen draw" program that makes you do most of the work. **EASYFLOW** is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With it you can quickly compose charts. More important, you can easily modify charts so they are always up to date.

- **Automatic:** Fully automatic text centering within shapes, both horizontally and vertically. Fully automatic line routing & re-routing.
- **Fast:** Written in assembly language for speed.
- **Large:** Charts up to 417 columns wide by 225 lines high. Chart too large for your printer? **EASYFLOW** automatically breaks the chart up & prints it in page size pieces.
- **Standard:** All standard flowcharting shapes included. Custom shapes can be ordered.
- **User friendly:** Don't take our word for it. PC Magazine says "**EASYFLOW** lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts". (March 10th 1987 issue, page 278.)
- **Mouse:** Optional but fully supported.
- **It prints:** On most popular matrix printers including IBM, Epson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
- **It plots:** On HP7440, 7475, 7550, 7570, 7585B and compatible plotters.
- **It works:** We are contractually prevented from mentioning the name of the "big eight" accounting firm that purchased a world-wide site license, but we can tell you that they spent months evaluating all available flowcharting packages before choosing **EASYFLOW**.
- **Rush delivery:** Order by noon today (eastern time) and you'll have it tomorrow. Rush delivery charge is \$10.50 (instead of \$2.00) and is available only to continental USA and Canada.
- **Documented:** 100 page manual plus over 150 screens of context sensitive help.

EASYFLOW works on IBM PC's, IBM PS/2 and compatibles. Requires 384 k memory, DOS 2.0 or higher and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card.

Order direct for only **\$149.95** + \$2.00 S&H (USA/Canada), \$10.00 (foreign). Payment by M.O., cheque, VISA, Mastercard or Company PO.



The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

HavenTree Software Limited
PO Box 1093-P
Thousand Island Park, NY 13692

Order Desk: 1-800-267-0668
Information: (613) 544-6035 ext 49
Telefax(G3): (613) 544-9632

CIRCLE 201 ON READER SERVICE CARD

■ DOS UNDER UNIX

VP/ix

If you're looking for a DOS-under-Unix environment that will tide you over until the next millennium, check out **VP/ix**, a joint venture of Interactive Systems Corp. and Phoenix Technologies. This program runs most DOS applications, supports VGA graphics as well as EMS, and handles the exciting SunRiver high-speed, high-resolution graphics terminal, so that several users can simultaneously use DOS (or Unix) graphics software.

VP/ix runs under Interactive Systems' own Unix variant, 386/ix, and is delivered with DOS 3.3. If you prefer, you can use your own version of DOS, since the program also supports DOS 3.2 and 2.x. The program costs \$695 for a two-user license, and \$1,395 for an unlimited license. The **VP/ix** package contains a useful and thorough manual, replete with easy-to-use scripts for installation and most aspects of system administration.

You should set aside about 1MB for each active **VP/ix** session in addition to the memory requirement for the host Unix system, which is usually 2MB. Because Unix can run more tasks than will fit in the memory, you can run about five simultaneous **VP/ix** sessions on a machine with only 4MB memory. But you will nonetheless



FACT FILE



VP/ix
Interactive Systems
Corp.
2401 Colorado Ave.
Santa Monica, CA
90404
(213) 453-8649

List Price: License for one or two users, \$695; unlimited license, \$1,395 (includes **VP/ix**, 386/ix operating system, TEN/PLUS user interface, and Channels Facility).
Requires: 2MB RAM, 40MB hard disk (DOS 3.3 included).

In Short: An easy-to-use DOS-under-Unix environment that supports EMS memory as well as VGA graphics. Designed for convenience more than for flexibility. Not copy protected.

CIRCLE 425 ON READER SERVICE CARD

Why Pay More?

"You can have the power and performance of the IBM PC/AT for half the price."

PC
MAGAZINE



ALTEC-XT / 10 TURBO SYSTEM \$595.00

- * 8088-1 PROCESSOR
- * 4.77/10 MHz DUAL SPEED
- * 640K RAM
- * 150W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL/1 GAME PORT
- * CLOCK / CALENDAR W / BATTERY BACKUP
- * 64-KEY KEYBOARD
- * 360K FLOPPY DRIVE
- * PHOENIX BIOS

ALTEC-286/10 \$ 875.00 ALTEC-286/12 \$ 975.00 ALTEC-286/16 \$1275.00

- * 80286 PROCESSOR RUNNING AT 6/10 OR 12 OR 16 MHz
- * 512K RAM
- * 80287 SUPPORT
- * DUAL HDD/FDD CONTROLLER
- * CLOCK/CALENDAR WITH BATTERY BACKUP
- * 200W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL PORT
- * 1.2MB FLOPPY DRIVE
- * ENHANCED 101 KEYBOARD
- * PHOENIX/AWARD BIOS

ALTEC ZIP -386/16 \$1795.00 ZIP -386/20 \$1995.00

- * 80386 PROCESSOR RUNNING AT 6/8/16 OR 20 MHz
- * 1MB RAM (EXPANDABLE TO 6MB)
- * 80287 / 80387 SUPPORT
- * DUAL HDD/FDD CONTROLLER
- * CLOCK/CALENDAR W/BATTERY BACKUP
- * 200W POWER SUPPLY
- * 1 SERIAL/1 PARALLEL PORT
- * 1.2 MB FLOPPY DRIVE
- * ENHANCED 101 KEYBOARD
- * PHOENIX/AWARD BIOS

TO ORDER, CALL 800-255-9971

International inquiry : 213-888-9100

Technical support : 213-888-0269

FAX : 213-888-6667



ALTEC
Technology Corp.

5751 Rickenbacker Road
Los Angeles, CA 90040
MON - FRI 9-6
SAT 10-4

*All Prices and specifications are subject to change without notice.

*ALTEC can not be responsible for errors in typography or photography.

*We reserve the right to substitute equivalent parts.

*All brand of product names are trademarks or registered trademarks of their respective company.

CIRCLE 270 ON READER SERVICE CARD



Benchmark Tests: DOS-under-Unix Environments

PC Labs tested VP/ix and Merge 386 using our standard suite of system benchmark tests as well as our multitasking load tests. We also ran the File Access tests against file space in the Unix partition of the disk. Both products supported this feature and performed significantly better than when they used the DOS partition.

In the 80386 Instruction Mix and File Access tests, Merge 386 performed faster than VP/ix on the same hardware, but not by much. Merge 386's lead in our single-tasking processor tests was consistent but not so large that it should sway a purchasing decision. Merge 386's performance on the File Access tests is another story. In the small-record File Access test, Merge 386 using the Unix file partition is almost twice as efficient as VP/ix.

Both VP/ix and Merge 386 held up well under the pressure of our multitasking load tests. VP/ix fell behind somewhat when performing the multitasking DOS File Access tests, but it outperformed Merge 386 on some of the Conventional Memory and 80386 Instruction Mix tests. This contrasts with Merge 386's faster times in our tests without multitasking, and highlights the packages' different strengths and weaknesses. Since neither package turned in glaringly bad results on any test, you should put the most emphasis on those aspects that reflect your needs to determine which package will be the better performer in your environment.

PC Labs' multitasking operating system benchmark tests determine the amount of performance degradation that operating environments suffer as they process more tasks. The tests use versions of the 80386 Instruction Mix and DOS File Access tests, which have been modified to run continuously. The modified Instruction Mix test accesses the processor and writes to the screen constantly, thus emulating a busy, processor-intensive application program. Similarly, the modified DOS File Access test emulates an I/O-intensive program.

Testing was conducted on a Compaq Deskpro 386/20 with a 60MB hard disk and 7MB RAM. With zero to three sessions of other modified benchmark test running in the background, we ran our standard 80386 Instruction Mix, Conventional Memory, and DOS File Access benchmark tests.

The **80386 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tests. The test program uses 80386 instruction code. These instructions are a subset of the total processor instruction set. The 80386 Instruction Mix implements a number of 32-bit operations in the 80386 processor these become single instructions, whereas in the 8086 and 80286 versions of the benchmark test they remain multiple instructions.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The **DOS File Access** benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file management functions. Five tasks—file creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.

The test is carried out for two different types of files—small record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

Processor and Memory Benchmark Tests

Performance Times (Times given in seconds)

	80386 Instruction Mix	Conven- tional Memory	File Access (small record) (Unix partition)	File Access (large record) (Unix partition)	File Access (small record) (DOS partition)	File Access (large record) (DOS partition)
VP/ix	3.12	0.46	59.92	48.78	70.07	44.09
Merge 386	3.02	0.43	33.61	19.77	54.38	38.56
OS/2 Competibility Box	2.94	0.41	N/A	N/A	56.35	10.69
DOS 3.2	2.91	0.40	N/A	N/A	57.29	10.46

N/A—Not applicable. OS/2 and DOS do not have Unix partitions.

Disk Benchmark Tests

80386 Instruction Mix Background Loop

Performance Times (Times given in seconds)

	No background session	One 80386 Instruction Mix background session	Two 80386 Instruction Mix background sessions	Three 80386 Instruction Mix background sessions
80386 Instruction Mix				
VP/ix	3.12	6.24	9.28	12.59
Merge 386	3.02	6.04	9.43	12.45
Conventional Memory				
VP/ix	0.46	0.95	1.21	1.63
Merge 386	0.43	0.92	1.40	1.61
DOS File Access (small record)				
VP/ix	70.17	60.15	60.94	61.88
Merge 386	54.38	48.44	61.62	76.45
DOS File Access (large record)				
VP/ix	44.15	47.39	47.33	47.27
Merge 386	38.56	33.27	42.18	54.39

DOS File Access Background Loop

Performance Times (Times given in seconds)

	No background session	One DOS File Access background session	Two DOS File Access background sessions	Three DOS File Access background sessions
80386 Instruction Mix				
VP/ix	3.12	4.07	4.26	4.16
Merge 386	3.02	6.44	6.59	8.37
Conventional Memory				
VP/ix	0.46	0.59	0.70	0.71
Merge 386	0.43	0.89	1.30	1.02
DOS File Access (small record)				
VP/ix	70.17	132.67	266.07	337.78
Merge 386	54.38	130.17	216.18	255.74
DOS File Access (large record)				
VP/ix	44.15	86.71	117.77	144.95
Merge 386	38.56	95.90	84.40	85.36

MORE FOR YOUR MONEY FROM...

BUSINESS

Ashion Tate	
Dbase IV	Special
Dbase IV LANpack	CALL
Dbase III Plus 1.1	CALL
Multimate Advantage II 1.0	299.
Framework III 1.0	CALL
Blue Publishing	
Form Tool 2.01	55.
Personal Lawyer	37.
Borland International	
Eureka 1.0	99.



Managing Your Money (Meca)

Your personal financial advisor! Write and print checks, set up budgets or a retirement plan, estimate your taxes and net worth. This integrated personal and small business finance program does all this and more! (Business) \$119.

Paradox 3.0	CALL
Quattro w/502+ 1.0	165.
Reflex 1.14	105.
Sidex Plus 1.0	133.
Sprint 1.0	136.
Broderbund	
PrintShop 2.41 (w/graphics lib. 1)"	39.
Central Point	
Copy II PC 5.0	21.
PC Tools Deluxe 5.0	39.
Computer Associates	
SuperCalc 5.1 0.0	319.
Cora International	
Corel 2.0	95.
Crosstalk Communications	
Crosstalk XVI 3.7	95.
Dac Software	
Dac Easy Accounting 3.0	59.
Dac Easy Light 1.0	45.
Dac Easy Report	45.
Delrina Tech.	
PerFORM 1.0	159.
Digital Research	
Gem III Present. Team	189.
Gem Draw Plus 2.01	189.

Fifth Generation	
Fastback Plus 2.01	109.
Fox Software	
Foxbase + Dev. Sys. 2.10	CALL
Funk Software	
Always 1.0	85.
Inword 1.0	59.
Worksheet Utils. 1.0	59.
Hayes	
Smartcom III 3.0	89.
Intel	
Quick 2.0	35.
Javelin Software	
Javelin Plus 2.02	249.
Lifetree	
Volkswriter Deluxe Plus	69.
Lotus Development	
HAL	109.
Freelance Plus 3.0	CALL
Metro 1.1	65.
Lotus 1-2-3 2.01	CALL
Manuscript 2.0	359.
MECA	
Checkwrite Plus 1.0	29.
Managing Your Money 5.0	119.
Tax Cut (for 1988 taxes)	49.
Meridian	
Carbon Copy Plus 5.0	115.
Micro Logic	
Tomado 1.8	55.
Microfly	
Wordfinder 4.0	35.
MicroPro	
Wordstar Pro 5.0	SPECIAL
Wordstar 2000+ Pers. 3.0	259.
Microfin	
Release for DOS 2.1	449.
Microsoft	
Works 1.05	99.
Excel 2.1	CALL
Windows 386 2.1	129.
Word 8.0	CALL
Monogram	
Dollars & Sense 3.1	105.

TaxView Federal (Softview)

Utilizing the power of Microsoft Windows (run-time version included) TaxView simplifies 1988 income tax preparation. Includes 74 IRS approved schedules & forms — for direct entry and automatic calculation. (Requires 80286/80386, min DOS 3.0, 640K HD, mouse & graphics adapter card) (Business) \$69

Nantucket	
Clipper (Summ.87)	429.
New England Software	
Graph In The Box 2	75.
Nolo Press	
WillMaker 3.0	35.
North Edge	
Timeslips III 3.3	119.
Paperback Software	
VP Expert 2.0	145.
VP Planner	54.
Paul Mace	
Mace Gold 1.0	79.
Mace Utils. 5.0	55.
Parsonic	
SeeMORE 1.02	49.
SmartNotes 2.0	49.
Peter Norton	
Norton Adv. Utils. 4.5	79.
Norton Commander 2.0	45.
Norton/Inside IBM PC	55.

PerFORM 1.0 (Delrina Tech.)

Take control of your business forms with the next generation in form processing software. True WYSIWYG interface, dropdown menus and powerful screen tools make form design a snap. Multiple font support. Horiz./vert. text. Form fill plus many other features. Req. 640K & graph. adpt. (Business) \$159.

Norton Advanced Utilities 4.5 (Peter Norton)

All the power and functionality of the classic standard — plus a wish list of technical features, functions and enhancements. Includes the new Norton Disk Doctor. The total solution for novice and expert alike. (Business) \$79.



Quartermack Office Sys.

DESQview 2.2	79.
Expanded Memory Mgr. 4.2	39.
Reference Software	
Grammatik III 1.06	52.
Simon & Schuster	
New World Writer III 1.0	65.
Typing Tutor IV	33.
Softlogic Solutions	
Disk Optimizer 4.01	45.
Software Carousel 2.02	49.
Softview	
TaxView Federal (88 taxes)	89.
Software Publishing	
Harvard Graphics 2.12	309.
Pts First Choice 3.01	95.
Pts First Graphics 1.0	95.
Pts Proflex. File 2.0	189.
Pts Proflex. Write 2.0	125.
Symantec	
Timeline 3.0	349.



Grandview 1.0	195.
Note-It Plus 1.02	49.
C & A Write 1.01	135.
4Word 2.0	69.
T/Maker	
ClickArt Business Images	42.
The XTREE Co.	
XTREE Pro. 1.0	69.
TOPS	
NetPrint 2.0	119.
Tops Flashcard	169.
TOPS 2.1	119.
Traveling Software	
LapLink Plus 2.1	85.
WordPerfect Corp.	
WordPerfect 5.0	239.
WordPerfect Executive	129.
WordPerfect Office 2.0	269.
XYQUEST	
XYWrite Plus 3.54	239.

CAD/CAM

American Small Bus. Comp.	
Design CAD 3.1 / 3D	each 159.
Generic Software	
Generic Cadd Lvl. 3 w/Dot Plot	135.

DESKTOP PUBLISHING

Adobe	
Illustrator - Windows Vers.	399.
Aldus	
Pagemaker 3.0	CALL
Software Publishing	
Pts First Publisher 2.0	79.

Xerox	
Ventura Publisher 2.0	CALL

EDUCATION & ENTERTAINMENT

Accolade	
Grand Prix Circuit	22.
Mean 18"	29.
Electronic Arts	
Chuck Yeager's Flight Trainer	32.
Grand Slam Bridge	45.
Microprose	
Gunsight	32.
Sierra On-Line	
Leisure Suit Larry II	33.
King's Quest IV (512K)	33.

LANGUAGES

Borland International	
Turbo C Profess. Pack	169.
Turbo C 2.0	99.
Turbo Pascal Profess. Pack	169.
Core International	
DB Fast Compiler	62.
Microsoft	
C Compiler 5.1	299.
Quick Basic 4.5	89.
Quick C 2.0	69.
Macro Assembler 5.1	99.
Peter Norton	
Norton Editor 1.3	39.

MEDIA

BASF Diskettes (boxed in 10's)	
5 1/4" DS/DD (360K) preform	12.
3 1/2" DS/HD (1.44Mb)	49.
Maxell	
5.25" MD2-HD (1.2Mb)	23.
Sony	
3.5 DS/DD (720K)	19.

ACCESSORIES

Curtis	
Robot w/fax modem prot.	69.
Universal System Stand	25.
Diamond SP	29.
Computer Toolkit	22.
Intertex	
Cables	CALL
Kerastone	
Masterpiece Plus	109.



Checkwrite Plus 1.0 (Meca)
Makes check-writing and bookkeeping faster than ever. For home or business, this flexible tool brings your financial routine under efficient control. Includes customizing and export features. (Business) \$29.



PowerTree 50 (modem/telex).....	59.
Universal Tilt Swivel.....	22.
Printer Muffler 132.....	57.

DRIVES

Seagate	
20Mb ST225 Int. w/cdr. (65ms).....	299.
40Mb ST251-1 Int. (AT/28ms).....	449.
Mountain Computer	
40Mb Tape Backup Ext.	479.
Plus Development	
Hardcard 20 Mb (49ms).....	549.
Quantum	
ProDrive 40AT/80 AT Int.	529/859.
TEAC	
3 1/2" 720K Drive (AT).....	95.
5 1/4" 1.2 Mb Drive (AT).....	114.

EXPANSION & UPGRADES

AST Research	
Advantage Premium 512K.....	CALL
Rampage Plus MC 512K.....	CALL
Fifth Generation	
Logical Connection 256K.....	CALL
Hercules	
Color Card CGA.....	159.
Intel	
Aboveboard 2 Plus 512K.....	479.
Inboard 386/AT (req. cabine).....	Special
8087/80287/80387 co-proc.	CALL
Orchid Technologies	
ProDesigner.....	339.
RAMQuest 16/32 Extra w/OK.....	339.
Video 7	
Fastwrite VGA w/256K.....	379.

- Visa and Mastercard accepted
- Your credit card will not be charged until your order is shipped.
- Corporate purchase orders subject to credit approval
- All products are covered by 120 day limited warranty *
- CT residents add 7.5% sales tax. N.J. residents add 6% sales tax.

SHIPPING

- Within continental U.S. - \$3.00 per order for U.P.S. ground delivery - except as noted below.
- Orders placed MON-THU for "in-stock" items ship within 24 hours. If you are more than 2 days away from us by U.P.S. ground, we ship 2nd-day air at no extra cost - except as noted below. C.O.D. order \$1,000 max. Surcharge \$1.00.
- UPS ground delivery and actual freight charges apply for computers, hard disks, Benetton, tape back-up, monitors and printers.
- Alaska, Hawaii, outside continental U.S. APO/FPO call for information.

*Defective software replaced immediately. Hardware replaced or repaired at our discretion.

Item availability and price subject to change without notice.

Software is not copy protected, except where marked by asterisk.

CONTEST RULES 1. Entries must be received on or before 6/30/89. 2. Winners selected in random drawings by attorneys for Micro Warehouse Inc. (MWH), whose decisions are final. 3. MWH Computer prize subject to availability. MWH reserves the right to substitute wholesale cash value up to \$10,000. 4. Winners responsible for taxes. 5. Odds of winning depend on number of entries. All prizes will be awarded. 6. MWH will announce the winners on or around 7/31/89. Winners notified by mail. Sales subject to change at the discretion of MWH. If unable to contact any winner, an alternate will be selected by random drawing. 7. Contest is open to U.S. residents, except where prohibited by law. Employees of MWH and suppliers not eligible. 8. Prizes - one NEXT Computer including keyboard and monitor and 150 software and media prizes.

Summagraphics
Summasketch Plus..... 399.

LAPTOPS

Toshiba
T3100e.....CALL

MODEMS

Everex
2400 Board Int. 149.
Hayes
Smartmodem 1200 Ext. 269.
Smartmodem 2400 Ext. 429.
Smart
1200 Bd. Pocket Modem w/soft. 119.
Practical Peripherals
1200/2400 Baud Ext. 109/187.

MONITORS

NEC
Multisync 2A, 3D.....CALL
Zenith
ZCM-1490 14" flat scrm. 699.

PRINTERS

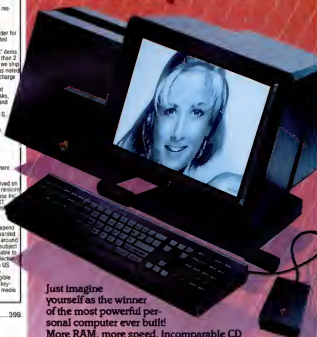
Canon
LBP-8 II Laser.....Special
Citizen
180D.....165.
Okidata
ML 182 Plus.....239.
ML 321.....CALL
ML 390.....CALL

ProDrive 40AT & 80AT (Quantum)
State-of-the-art fast, rugged and reliable 42mb and 84mb 3 1/2" AT hard drives from Quantum, Av. 19ms access time. 1.1 Interleave. Includes DsCache and patented AIRLOCK automatic shipping lock. High performance at exceptional prices. (Drives) ProDrive 40AT \$529. ProDrive 80AT \$859.

INPUT DEVICES

Keytronics	
101 Keyboard.....	99.
101 Keyboard Plus.....	99.
Logitech	
Series 2 Mouse (PS/2).....	65.
Mouse w/Logidac.....	119.
Microsoft	
Mouse w/Windows & Paintbr.	145.
Mouse w/Windows 286.....	139.
MSC Technologies	
Omni Mouse w/drgsr. Pop-up.....	57.

Professional Write 2.0 (Software Publishing)
Easy-to-use word processor with many sophisticated features. Excellent support for lasers (multiple fonts per page). Integrates with other P/S software and has powerful Import/Export functions. Includes address book and spell checker. (Business) \$125.



Just imagine yourself as the winner of the most powerful personal computer ever built! More RAM, more speed, incomparable CD quality sound — THE personal computer of the 1990's. All you have to do is enter the MICRO WAREHOUSE SUPER COMPUTER GIVEAWAY.

Your name is automatically entered into the drawing when you order from Micro Warehouse. Or just send in the official entry coupon.

Our helpful telephone staff is standing by, seven days a week to take your call.

I'm Kerry, call me at:

MicroWAREHOUSE™

1-800-367-7080

(1-800-DOS-7080)

CIRCLE 129 ON READER SERVICE CARD

Inquiries 201-370-0518 Fax# 201-905-5245

Monday through Friday

8 a.m. to 11 p.m. (Eastern)

Saturday and Sunday 8 a.m. to 8 p.m.

MICRO WAREHOUSE™ 1690 Oak Street, P.O. Box 1579, Lakewood, N.J. 08701

© 1989, Micro Warehouse Inc. MICROWAREHOUSE™ is a trademark of Micro Warehouse Inc. NEXT is a trademark of Next, Inc.



OFFICIAL ENTRY COUPON

SPM041

Micro Warehouse Giveaway, 1690 Oak Street, P.O. Box 1579, Lakewood, N.J. 08701

When you order by phone or mail, you are automatically entered in the drawing. You can also mail this coupon or call our contest entry line 1-800-367-0711.

Name.....
Address..... Apt.
City..... State..... Zip.....

DOS ON A TERMINAL

If you're interested in running DOS applications on a Unix system, you can choose from three classes of terminals. Here is a brief description of what's available.

In a multiuser Unix system, one lucky user can use the system console (which is compatible with a graphics adapter) and keyboard, while the rest must use terminals—even if they're running DOS applications that can take advantage of graphics facilities. Since most DOS applications will shift down to running on the IBM Monochrome Display Adapter (MDA), in a character-only mode, you'll still be able to run most of them on an ordinary serial terminal that doesn't use a graphics adapter—at the cost of those stunning displays all PC users have come to expect.

If you're going to run DOS applications on a Unix system, you'll have to choose from among three classes of terminals. You should be aware, however, that many terminals can't display the IBM MDA extended character set, which most DOS applications use. Instead, the terminal may require characters from its own character set to be substituted. In addition, because the

keyboards don't exactly resemble that of the PC AT, not only will you have to adjust to a new keyboard layout, you'll also have to make sure that your DOS-under-Unix system is flexible enough to provide for keyboard input mapping. And you must be sure that you'll have every possible required keystroke combination available for your DOS application as if you were using a PC keyboard—even if your terminal offers fewer keys.

A WORD FOR THE WYSE Some terminals are designed to mimic the action of the PC keyboard and screen while behaving like standard terminals. An example is the Wyse Technology WY-60, which we tested with a variety of DOS applications. The WY-60's 25-line screen does a very serviceable job of emulating the IBM MDA, so you should have no problem running most spreadsheets, word processors, and databases; most of them run on the MDA.

You won't want to brag about this ter-

minal's display speed, but you should find it adequate for most applications. The 9,600-bit-per-second connection to the host can update the screen in about 2 seconds, but most changes occur faster because only part of the screen is changed.

The WY-60 keyboard looks just like a standard PC keyboard: all the keys are where you would expect them to be, and oddball keystroke combinations such as Ctrl-Alt-SysReq work the way they should. The WY-60 has a list price of \$599.

DEC'S SERIAL APPROACH If you have to use DOS software on an ordinary serial terminal like Digital Equipment Corp.'s DEC VT-330, which we also tested, you will need to retrain your reflexes. From afar, the keyboard supplied with the VT-330—and with the inexpensive VT-320—looks like an AT keyboard, but up close you'll notice that the legends are different on many keys,

less see some speed degradation, since Unix uses disk storage to augment main memory when the tasks exceed the memory capacity.

Within the *VPix* environment, most things work as they would in a standalone DOS system. For example, when you issue the *vpix* command, the system chugs away briefly, then the screen clears, and you see DOS boot. What appears looks a lot like a warm boot on a running DOS system, and the process takes about as long. At the conclusion, you get a *Z>* prompt. At this point you could almost fool your colleagues into thinking that you were running DOS by itself rather than as a job on a Unix system. But most people's first comment would probably be, "Hey, where'd you get a *Z*: drive?"

VPix solves the problem of group access to nonshareable peripherals, such as

the floppy disk and the serial ports, by having configuration files. If a user has a personal *VPix.CNF* file, then the settings specified there apply; otherwise the settings in a global *VPix.CNF* apply. In a multiuser environment, you would usually use *VPix.CNF* to restrict access to nonshareable devices in the default *VPix.CNF*—and then enable them for certain privileged users in individual files. *VPix* will warn you if a second user starts a session that is configured to access a nonshareable device.

It is disconcerting when you start *VPix* and first see a warning, for example, that the floppy disk drive cannot be accessed. But I quickly realized that such a warning is better than simply getting the message "General failure accessing drive A" when you try to access the device from within DOS. It is also possible to release a drive in

one session so that it can be picked up by another. This area of *VPix* is more rigid than the corresponding features in the *Merge 386* program.

Z: EQUALS C: *VPix*'s way of handling the C: drive may surprise you—especially if, like most DOS users, you expect C: to refer to your main hard disk. *VPix* has a C: drive, but many users will never need it, because Z: is the DOS drive ID that corresponds to the Unix file system, where most files are stored. In fact, C: is not a real hard disk but a virtual disk—a file in the Unix file system that has been structured to mimic a DOS disk drive. In this virtual drive are the "hidden" files that DOS uses to boot, and the *COMMAND.COM* file, plus *CONFIG.SYS* and *AUTOEXEC.BAT*.

VPix's virtual drive doesn't have a

which means that they aren't where you'd expect them to be.

Using the VT-330 to run DOS software is difficult because many common PC keys require multikey sequences on this keyboard. Most of the key combinations start with the Esc key, so you must strike Esc twice to escape. (Try that key-stroke combination in *Microsoft Word*, where the Esc key is already overloaded with several functions!)

You'll find this terminal a reliable performer once you are used to it. But in the interim, if you're used to a PC keyboard, you're certainly not going to like the readjustment.

Then, too, the VT-330, like many other terminals, can display only 24 lines of text. Standard PC displays show 25 lines of text, all of which are used by DOS applications. You can define a key that will expose the hidden line, but we'd prefer to see the whole screen all the time. The DEC VT-330 costs \$2,038; the VT-320 lists for \$545.

fixed size. It is big enough to store a few utilities, but it's not the place to install a major application program.

In addition to a default C: drive, each user or group of users can have a personal C: drive. The default C: drive is not writeable by ordinary users, so those who want to manage their own CONFIG.SYS or AUTOEXEC.BAT will need their own C: drives.

One of the VPix features that you can access through CONFIG.SYS is EMS memory. The manual warns that you should be stingy in allocating such memory, because using EMS makes each DOS session consume more precious space in the main memory. One VPix session with a full 2MB EMS allotment takes up about as much memory as three VPix sessions that don't use EMS.

VPix's most obvious weakness is its

THE ULTIMATE—SUNRIVER If you don't want to compromise and you have the money to spend, you can have it all with SunRiver Corp.'s EGA, EGA Plus, and VGA Plus terminals. Listing for \$1,999, \$2,299, and \$2,499, respectively, these terminals give you a graphics screen, a standard PC keyboard, and a blazing fiber-optic link between your system and the display/keyboard unit.

If it were not for the absence of a floppy disk drive in the system unit, you might be fooled into thinking you were using a standalone PC after you saw this unit's screens and performance. In fact, we found that as demanding a graphics software program as *Microsoft Windows* ran about as well on the SunRiver terminal as it did on the system console.

Of course, you get what you pay for: the top-of-the-line SunRiver VGA Plus costs more than some complete AT-compatible systems. But going this route is the egalitarian way for a group of people to share a system. —Kaare Christian

very slow EMS implementation. Yes, you can run software that needs EMS, but don't plan to break any speed records: the EMS emulation of VPix runs about as fast as EMS on a 4.77-MHz PC, circa 1983.

Most intriguing is VPix's support for the SunRiver graphics terminal (except when you are using the Sun 386i). The SunRiver terminal connects to an adapter board in the host computer that supports four EGA or VGA terminal connections. Each of these terminals is, like any ordinary dumb terminal, just a screen and a keyboard that you use to interact with a host computer. But the SunRiver has a number of distinctions: its use of fiber-optic technology to reduce communication time to almost nothing; its emulation of an EGA or VGA adapter, so that you can use graphics programs; its use of a PC keyboard, so that every key is where you ex-

PC EDITOR'S CHOICE

• Ease of use vs. flexibility

There are two situations that require a DOS-under-Unix program: if you're a DOS user and want to bring multiuser and multitasking functionality to that operating system but you also need to use Unix, or if your primary operating system is Unix and you want access to the large base of sophisticated DOS applications.

As we've noted in the introduction to this article, users who already run a version of the Unix operating system may only be able to consider one of the two products we've reviewed or a variant from a secondary vendor. On the other hand, DOS users who are not committed to a particular version of Unix will find that both Merge 386 and VPix are good choices, but for different reasons.

Although VPix and Merge 386 take similar approaches to creating a DOS-under-Unix environment, they diverge in ease of use and configurability. If you're looking for a DOS-under-Unix program that will get a functional DOS environment up and running with the least amount of effort on your part, look no further than VPix. But for environments where flexibility and efficiency are of paramount importance, particularly those burdened by heavy multiuser loads, Merge 386 gets the nod as the stronger product.

pect it to be; and its inclusion of serial and parallel ports, so that you can enhance your DOS graphics environment with local printers, mice, and modems.

SPEED AND COMPATIBILITY The performance of VPix is clearly adequate, although Merge 386 is somewhat faster in a number of areas. We tested VPix run-

■ DOS UNDER UNIX

ning under 386/iX—Interactive Systems' version of Unix System V, Release 3.0, for 386-based PCs—on a Compaq Deskpro 386/20 with 7MB of memory and a 60MB disk. When you run just one session, *VP/iX* generally performs close to the speed of native DOS. *VP/iX* turned in good performance on file I/O operations and excellent performance on computational operations and graphical displays.

VP/iX turned in favorable results on our compatibility tests; in fact, we were able to run all of the DOS programs we tried. *Lotus 1-2-3* and *Microsoft Flight Simulator* worked without a hitch. So did the serial version of the Microsoft Mouse. *Microsoft Word* worked fine on the console, but when we tried to run it on a serial terminal, the system seemed to think a graphics display was available and accordingly scrambled the console screen. Yes, a program running on a serial terminal was able to demolish the console screen display, in the

process defeating the 386's memory protection features. You can run *Word* on a serial terminal, but you must explicitly use the /C option to tell *Word* to use character mode.

We encountered one minor difficulty that stems from *VP/iX*'s use of a Z: drive. Some programs, like *Microsoft Windows*, have no problem working with drive Z:, but others, like *DESQview*, have a C-centric view of the world. We were able to use *DESQview*, but its installation program completely gave up after asking a handful of questions about our environment. When we exited *DESQview* after using it for a long time, the DOS session froze. We weren't able to repeat the problem, so we could not determine whether the difficulty was with *DESQview*, *VP/iX*, or the hardware.

Microsoft Windows worked beautifully, both on the console and on the SunRiver terminal. On the console, using the

screen switch to go to or from a graphics session was a sluggish procedure, but the facility worked flawlessly. All of the systems that support *VP/iX* (except the Sun 386i) also support screen switching on the console, so that you can switch from one console session to another.

There's a lot to like about *VP/iX*. It ran every DOS program we tried, and it also did well on the PC Labs benchmark tests, both when the machine was supporting just one user and when it was running several heavy background jobs to simulate multiple users. Its support of VGA graphics, EMS, and the SunRiver graphics terminal makes it a good choice for the decade to come. PC

Kaare Christian is a research associate at The Rockefeller University, where he uses both Unix and DOS to build scientific instruments. He is also the author of five books on the Unix operating system.

It's Here Now And It's Going Fast.

Uncompromising Reliability Teams Up With Unparalleled Performance.

30MHz

Dyna 30MHz 80386 Cache System —One Step Ahead.



Prices range from \$4,995
to \$24,769

DYNA

3081 North First St.
San Jose, CA 95134
(408) 943-0100
FAX (408) 943-0642

PERFORMANCE BENCHMARKS

- LANDMARK SPEED TEST (VERSION 4.0) 498MHz
- NORTON S.I. RATING (VERSION 4.0) 36.3
- POWER METER MIPS TEST 6.96 MIPS

HARDWARE FEATURES:

- 80386™ CPU (Intel)
- Custom-designed 64K RAM cache and controller (implemented in PALs), nearly a 60 percent calculated hit rate
- One to 24 megabytes of RAM available
- 80387 and Waitek support (stand-alone or simultaneous mounting)
- Tower enclosures (six half-height or three full-height drive enclosures)
- Monographic, EGA and VGA options available
- MF, ESDI and SCSI hard drives and controllers available
- Drive capacities range from 40 megabytes to 780 megabytes
- DOS, UNIX, NetWare, OS/2 and XENIX compatible 10MHz I/O bus speed

Dyna Computer, Inc. has over six years experience in the design and manufacture of PC, 8088, 286 and 386 motherboards and systems.

SERVICES:

Reliability is the first thing on your mind and at Dyna Computer we make it our number one priority. Our goal at Dyna Computer is to serve and maintain you, the customer. Dyna Computer fulfills your performance/throughput requirements by designing today's highest performance Intel-based 80386™ microcomputers.

Support and service are next on your agenda and ours. If your company needs nationwide on-site service or a guaranteed 48-hour desk service contract, we can, in most cases, effectively channel your requirements.

We realize that many corporations need to lease their computers. Dyna Computer equipment is available via lease scheduling for qualified companies.

At Dyna Computer, as at most companies, well over 90 percent of our business comes from repeat customers. So for your benefit, Dyna Computer goes out of its way to make sure that your requirements are met.

Call one of our highly trained systems sales consultants today. We will prove to you that at Dyna Computer we make it our business to satisfy your business systems and peripheral requirements.

CIRCLE 379 ON READER SERVICE CARD

TURBO 375™

**PC MAGAZINE'S
TECHNICAL EXCELLENCE
FINALIST**



A standard power supply just isn't enough.

Ordinary power supplies, like the ones found in off-the-shelf PCs, will not meet the demands of today's high-performance systems. For serious business applications, you need a power supply that will not skip a beat during a hard disk access or when the line voltage sags. One that actually allows the use of all those slots and drive bays you paid for. One that is engineered for uncompromised performance, reliability, and safety.

More power to you.

The Turbo 375 is the one. It's the most powerful unit available for your AT or Tower computer. In fact, it can run a 10MIPS, 3GB machine! Even if you don't need that kind of muscle, the Turbo 375's wide input range, independent regulation, enhanced cooling, and other premium features insure optimum system reliability.

Complete PC/XT/AT and Compaq power line.

In addition to the Turbo 375, we offer over a dozen power supply models to choose from. They include the ultra-quiet Silencer™ 150/200 series, the high-performance Turbo-Cool™ 150/200/250 series, and a powerful new 250 watt supply designed for the Compaq Deskpro.

Guaranteed to last.

Every product, from our least expensive XT power supply to our top-of-the-line Turbo 375, is rigorously tested and backed by an unmatched warranty program.

Call PC Power & Cooling—the power supply specialists—for complete technical information or to place your order. VISA/MC/COD/PO



PC POWER & COOLING, INC.

31510 Mountain Way, Bonsall, CA 92003

(619) 723-9513 • FAX (619) 723-0075

CIRCLE 473 ON READER SERVICE CARD

PC BRAND Chosen #1 For Customer Service and Support.

"PC BRAND is the LL Bean of the personal computer mail order.

PC BRAND wants no unhappy customers, and it's service and support policies help to insure that."

*-Personal Computing's 10 Best Mail
Order Companies, Feb, 1989*



PC BRAND™

PC BRAND offers you more...

Welcome to PC Brand. Your *first* place to shop. Your *best* place to shop for top quality IBM compatible systems, custom configured to your exact specifications, and thousands of quality name brand peripherals & accessories.

Choose from over 10,000 items in stock... all at unbeatable prices!

Free Freight, Toll-Free Support, 5-Year Warranty and more...

Everyone promises you great service. We deliver the tangibles.

Free freight • Fast delivery
• No credit card surcharges
• A 30-day Money-Back Guarantee on every system we sell • Toll-Free Technical Support that will stay with you until your questions are answered and your problem is solved • And our exclusive 5-Year Warranty (call for details) on all PC Brand products.

Call PC Brand today.

For the best selection... the best products...at the best price, you can't do better than PC Brand. Call PC Brand today!

PC BRAND 286/12 \$949

12 MHz Clock, Zero Wait Operation,
Norton SI 15.3 •Landmark™ Speed 16MHz
512K, 1.2MB or 1.44MB Drive, 101- Keyboard

Standard System Features:

- 80286 Processor Operating at 12MHz with Zero Wait States delivering 16MHz Effective Throughput
- 512K RAM expandable to 4MB on the System board using 256K and/or 1MB 100ns RAM chips
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive Controller
- Enhanced 101-key AT Style Keyboard
- High Capacity System Power supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM, and PCNET compatibility
- Built-in System Board LIM EMS hardware drivers
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit)
- Small foot print case with 5 Disk Drive bays

Options:

- Full size 5 drive case • Factory Installed RAM Upgrades
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD Portable • Tower Case

Standard Pre-Built Configurations:

286/12 With 512K, Hard Disk Drive, Monitor & Video Card				
Drives	20MB 1:1 MFM	40MB-40MB 1:1 MFM	40MB-20MB 1:1 MFM	20MB-20MB 1:1 MFM
VGA				
Mono	\$1335	\$1439	\$1548	\$1679
EGA	\$1729	\$1833	\$1942	\$2073
VGA	\$1900	\$2004	\$2113	\$2244

PC BRAND 286/20 \$1300

Ideal Novell Server!

20 MHz Clock, Zero Wait Operation
Norton SI 20.4 •Landmark™ Speed 25.9MHz
512K, 1.2MB or 1.44MB Drive, 101-Keyboard

Standard System Features:

- 80286 Processor Operating at 20MHz with Zero Wait States in interleave mode delivering 26MHz Effective Throughput
- 512K RAM expandable to 8MB on the System board using 256K and/or 1MB 100ns RAM chips (4MB on motherboard and 4MB on optional special interleaving daughter card)
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM, and PCNET compatibility
- Built-in System Board LIM 4.0 EMS hardware drivers
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit)
- Medium foot print case with 5 Disk Drive bays

Options:

- 386SX Upgrade • Tower Case • 4MB Interleaving Ram Card
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD Portable • Factory Installed RAM Upgrades

Standard Pre-Built Configurations:

286/20 With 512K, Hard Disk Drive, Monitor & Video Card						
Drives	40MB-40MB 1:1 MFM	40MB-20MB 1:1 MFM	20MB-20MB 1:1 MFM	10MB-20MB 1:1 RLL	150 MB 1:1 ESDI	330 MB 1:1 ESDI
VGA						
Mono	\$1790	\$1899	\$2030	\$2296	\$3000	\$3923
EGA	\$2184	\$2293	\$2424	\$2690	\$3430	\$4317
VGA	\$2355	\$2464	\$2595	\$2861	\$3700	\$4488

TURN PAGE FOR MORE PC BRAND SYSTEMS...
FOR NAME BRAND PERIPHERALS SEE OUR AD ON FOLLOWING PAGES...

To Order Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841

PC Brand, Inc. 954 West Washington Street, Chicago, IL 60607 1-800-722-7263. We are open Monday thru Friday: 9am to 6pm CST. VISA, MasterCard, Discover, Checks, and Approved P.O.s are Accepted. Prices subject to change. For Order Status and Customer Service Inquiries Call: 1-800-662-SERV

CIRCLE 308 ON READER SERVICE CARD



PC BRAND™

Your Best Choice
for Quality Systems
Toll-Free Support
Toll-Free Service
Free Freight
5-Year Warranty



PCV20 AD-II \$669

15 MHz Throughput in an XT. Complete w/ Monographics Card & Monitor. Norton SI 4.0 512K, 360K Drive, Mono Card & Monitor, 84-Keyboard

Standard System Features:

- 10MHz Nec V20 CPU with 1.5 times the power of the 8088!
- 512K RAM standard. Expandable to 640KB
- One 360K Floppy Drive • 84-key AT Style Keyboard
- 8 Slots. Serial, Parallel, Game Ports, and Clock Standard
- All Ports and FDC Built into Motherboard for Increased Reliability
- Hercules Compatible Graphics Card
- 12" Monochrome Monitor
- Accommodates up to 4 HH Mass Storage devices
- AT Style Case with Keylock, Turbo, Power and Hard Drive LEDs.
- Set-up & Operating instructions.

Standard Pre-Built Configurations:

PCV20 AD-II With 512K, Hard Disk Drive, Monitor & Video Card					
Video Drive	1 Floppy	2 Floppy	20MB	30MB	40MB
Mono	\$669	\$740	\$924	\$950	\$1077
RGB	\$839	\$914	\$1098	\$1124	\$1241
EGA	\$1059	\$1134	\$1318	\$1344	\$1461

PC BRAND 386/20 \$1995



20 MHz Clock, Zero Wait Operation
Norton SI 24 • Landmark Speed 30MHz
1024K, 1.2MB or 1.44MB Drive, 101-Keyboard

Standard System Features:

- Intel 80386 Processor Operating at 20MHz with Zero Wait States in interleave mode delivering 30MHz Effective Throughput
- 1024K RAM standard expandable to 16MB via 32Bit RAM boards using 256K and/or 1MB 100ns RAM chips
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 or 80387 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM and PCNET compatibility
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit)
- Medium foot print case with 5 Disk Drive bays

Options:

- 32/64KB Cache Processor • Weitek Coprocessor • Tower Case
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD Portable • 8MB 32Bit RAM Card Upgrade

Standard Pre-Built Configuration:

386/20 With 1024K, Hard Disk Drive, Monitor & Video Card					
Drives Video	40MB-40MB 1:1 MFM	80MB-20MB 1:1 MFM	80MB-20MB 1:1 MFM	110-20MB 1:1 ECL	160-40MB 1:1 ECL
Mono	\$2540	\$2649	\$2780	\$3046	\$3750
EGA	\$2934	\$3043	\$3174	\$3440	\$4250
VGA	\$3105	\$3214	\$3345	\$3611	\$4400

TOWER STYLE CASE \$220

Add \$220 to any Desktop Configuration



Modeled in IBM's PS/2-80 Style, this unit offers:

- 285 Watt Power Supply
- Two 3.5" Front Accessible Drive Bays
- Two 5.25" Front Accessible Drive Bays
- One 5.25" FULL SIZE Internal Drive Bay
- TURBO MHz Digital Speed Display
- Easy Access Snap-off Side Panel for quick "no-screwdriver" access to internals

"Tower" is a Registered Trademark for NCR Corporation

PC BRAND 386/25 \$2450



"PC Brand offers the best low cost alternative around"

-PC Magazine's Editors Choice Feb.14, 1989

"Faster Than a Speeding Bullet!"

-Computer Shopper Cover Story Nov, 1988

25 MHz Clock, Zero Wait Operation
Norton SI 28.3 • Landmark Speed 35MHz
1024K, 1.2MB or 1.44MB Drive, 101-Key-board

Standard System Features:

- Intel 80386 Processor Operating at 25MHz with Zero Wait States in interleave mode delivering 35MHz Effective Throughput
- 1024K RAM standard expandable to 16MB via 32Bit RAM boards using 256K and/or 1MB RAM chips
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 or 80387 Co-Processor Support
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM and PCNET compatibility
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (6 16Bit & 2 8Bit & 2 32Bit)
- Medium foot print case with 5 Disk Drive bays

Options:

- 32/64KB Cache Processor • Weitek Coprocessor • Tower Case
- Custom configurations w/ Name Brand peripherals of your choice
- Compaq® Style LCD Portable • 8MB 32Bit RAM Card

Standard Pre-Built Configurations:

386/25 With Hard Disk Drive, Monitor & Video Card						
Drives	40MB-20MB 1:1 MFM	40MB-20MB 1:1 MFM	80MB-20MB 1:1 MFM	110MB-20MB 1:1 MFM	170-16MB 1:1 ESDI	320-16MB 1:1 ESDI
Video						
Mono	\$2940	\$3049	\$3180	\$3446	\$4200	\$5073
EGA	\$3334	\$3443	\$3574	\$3840	\$4600	\$5467
VGA	\$3905	\$3614	\$3745	\$4011	\$4800	\$5638

Your PC Brand Advantages:

30-Day Money Back Guarantee
Free Freight
Toll-Free Support
Toll-Free Service
No Credit Card Surcharges
5-Year Limited Warranty

*As a PC Brand customer, you'll enjoy the best warranty coverage in the industry. Warranty covers all PC Brand system motherboards, power supplies, RAM, keyboards and all expansion cards. 100% parts & labor are covered year one. 80% parts year 2-40% parts year 3-40% parts year 4-20% parts year 5. Additional extended coverage contracts available for a fee. Floppy, hard disks and tape drives are covered for one year only. Manufacturer's warranty applies to all non-PC Brand products. Complete warranty information available on request.

LCD PORTABLES from \$1770

286 & 386 Systems
512K/1.2MB Drive,
Combo Controller,
Backlit Display

*386 Systems
come w/1024K.



Select the power & features of our 286 & 386 desktops in a self-contained, light (20 lbs.) high impact plastic housing similar to the COMPAQ® Portable III.

All feature:

- 640 x 400 Backlit Supertwist LCD by TOSHIBA
- Monographic & Color operating modes, EGA Optional
- External Monitor Support, External Keyboard Port.
- 5 expansion slots (3 long, 3 short) • 86-key keyboard.
- Accommodates two 5.25" or 3.5" Floppy/Hard Disk Drives
- 200 Watt 117/220 Autoswitch Power
- Serial, Parallel, Game Port, Clock/Calendar Standard

Standard Pre-Built Configuration:

Portable System Processor and Drive Options				
Drive \ CPU	286/12	286/20	386/20	386/25
1 Floppy	\$1770	\$2070	\$2650	\$2900
20MB	\$2079	\$2379	\$2959	\$3210
40MB	\$2200	\$2500	\$3100	\$3300
71MB	\$2800	\$3100	\$3600	\$3900
100MB 1:1 ESDI	\$3400	\$3700	\$4250	\$4500

SAVE ON NAME BRAND PERIPHERALS... SEE OUR AD ON FOLLOWING PAGES...

To Order Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841



PC Brand, Inc. 954 West Washington Street, Chicago, IL 60607 1-800-722-7263. We are open Monday thru Friday: 8am to 6pm CST. VISA, MasterCard, Discover, Checks, and Approved P.O.s are Accepted. Prices subject to change. For Order Status and Customer Service Inquiries Call: 1-800-462-SERV

CIRCLE 304 ON READER SERVICE CARD

Shop PC Brand Today.

LAPTOP COMPUTERS*

TOSHIBA	
1000; 512K, 80C88, 1 FDD	\$769
1600 BACKLIT, 80C86, 12, 1MG, 20MB HD/FDD	3175
1200HB; BACKLIT, 1MB, 20MB HD/FDD	2395
3100E GAS PLASMA 80C86-12, 3MB, 20MB HD/FDD	2750
3200; EGA, 80286-12, 1MB, 40MB HD, FDD	3525
5200/40 VGA, 80386-20, 2MB, 40MB HD, FDD	5995
NEC	
MULTISPEED HD	2275
ULTRALITE W/1MB	Call
MITSUBISHI	
MP286L-220; 80286, 20MB HDD, FDD	\$2439

Call on New NEC & TOSHIBA Models

MONITORS*

NEC	
Multisync 2A 14" (800x600) EGA/VGA	\$499
Multisync GS 14" Mono	249
Multisync 3D 14" (1024x768) EGA/VGA	659
Multisync Plus 15" (960x720)	895
Multisync XL 19" (1024x768)	2395
MAGNAVOX	
All Magnavox monitors feature 2 Yr. Warranties!	
12" Amber TTL Monochrome	\$79
14" VGA Paper White Flat Screen	145
13" RGB (640x200) Color	230
13" EGA (640x400) Color	339
14" VGA (800x600) Color	415
PRINCETON GRAPHICS	
Max 15 15" Multifreq. Monochrome	249
Ultra 16 16" Multifreq. EGA/VGA	879
UltraSync 12" Multifreq. EGA/VGA	520
SEIKO	
CM1430 14" (1024x768) Multifreq	\$619
CM1420 (noninterlaced) Multifreq	1079
MITSUBISHI	
XC-1410 14" EGA (640x350)	\$369
1381 Diamond Scan	499
3905 19" CAD Monitor	1965
6905 19" CAD Monitor	2285
SONY	
CPD1302 13" Multiscan (1024 x 768)	645
CPD1320 13" (640 x 480) VGA	Call
ZENITH	
1490 Flatscreen Enhanced	\$600

NEC 14" Multisync IIA

800x600 Resolution Super VGA Monitor



\$499

Freight Free!

MODEMS

PC BRAND 100% Hayes Compatible!	
1200 Baud Internal w/Bitcom	\$49
1200 Baud External	70
2400 Baud Internal w/Bitcom	89
2400 Baud External	129
HAYES	
1200 External	\$270
2400 External	415
A.T.I.	
2400ETC Internal Modem w/MNP5	165
US ROBOTICS	
Courier HST/9600	\$599
Courier V.32 9600 Baud Ext.w/MNP5	889

Internal Modems

100% Hayes Compatible. Free Software!

1200BPS	\$49	
2400BPS	\$89	

TAPE BACK-UP SPECIAL

40MB Internal Tape Back-Up	
\$200	
Uses DC2000 Series Micro Cartridges same as Irwin, XT/AT and Novell Compatible. Limited Quantity!	

VIDEO CARDS

PC BRAND	
Mono Graphics w/Printer Port	\$55
Color Graphics w/Printer Port	49
EGA (640x480) Autoswitch	149
VGA	220
PARADISE	
Autoswitch 480 EGA	\$177
VGA+	279
VGA+ 16 16 Bit Version NEW	309
VGA Professional	465
VIDEO SEVEN	
VEGA DELUXE	\$209
VEGA VGA	268
FASTWRITE VGA	379
VRAM VGA	475
NEC	
1024-256	\$1175
MVA 1024	949
ATI	
EGA Wonder	\$229
VGA Wonder	329
VIP VGA	260

DISK DRIVES

FLOPPY DISK DRIVES:	
360K 5.25" HH Black	\$75
720K 3.5" HH w/5.25" Mounting	80
1.2MB 5.25" HH Grey	85
1.44MB 3.5" HH Grey w/5.25" Mounting 95	
PS/2 FLOPPY DRIVES	
CMS 5.25" 360K/PS/2 Ext.Floppy	\$199

MINISCRIBE 3180E

150MB 1/2 HT. 16MS ESDI **\$1295**

Largest Capacity, Highest Performing Half Height Drive on the Market!

HARD DISK DRIVES:

SEAGATE	
20MB 65MS ST225 w/XT Controller	\$259
20MB 35MS ST125 w/XT Controller	299
20MB 35MS ST125	245
30MB 65MS ST238 w/XT Controller	285
30MB 35MS ST138	310
30MB 35MS ST138 w/XT Controller	355
40MB 40MS ST251	350
40MB 28MS ST251-1	409
80MB 28MS ST4096 Full Height	590
MINISCRIBE	
40MB 61/40MS M3650	\$319
40MB 25MS M3053	455
63MB 61/40MS M3675 RLL	349
71MB 22MS M3085	659
71MB 28MS M6085 Full Height	559
110MB 22MS M3128 RLL 1/2 Height	699
150MB 16MS M3180E ESDI 1/2 Hgt!	1295
320MB 16MS M9380 ESDI Full Height	1975
640MB 16MS M9760 ESDI Full Height	3525
PRIAM	
45MB 28MS ID45H Half Height	\$489
130MB 20MS ID130AT Full Height	1395
132MB 20MS ID130PS INT. for PS/2	1450
160MB 28MS ID160EC ESDI w/CNTRL	1650
230MB 25MS P230R2 RLL Full Height	1495
330MB 20MS ID330PS INT. for PS/2	1895
330MB 20MS ID330EC ESDI w/CNTRL	2250

Priam External and PS/2 Drives also Available

IOMEGA	
B1201 Single 5.25" 20MB Int.	\$795
B220 Dual 5.25" 20MB Ext.	1619

If the drive you require is not listed here please contact our sales department for a quote!

TAPE BACKUPS

60MB Archive QIC Internal or Ext.	\$590
60MB Maynard Maynstream Portable	889
60MB Maynard Maynstream for PS/2	889
68MB Irwin External	549
80MB Irwin Internal	509
150MB Archive Internal	925
150MB Maynard Maynstream Port.	1395
2.2GB Maynard 2200HS 8mm Drive	4350

Save Time. Save Money.

SCANNERS/DIGITIZERS

The Complet PC Handscanner	165
Deat 1020/2020 Scanners	Call
Diamond Flower H53000 Hand Scan	249
300/400DPI 6 Grey Levels HALO DPE Desktop Publisher GEM/HALO/ PC-Print/Windows File Format Output.	
Hewlett Packard Scanjet	989
Microtek MSF300G	2895
Microtek MSF300C	1325
Microtek MSF300Q w/64 Grey Levels 1850	
Princeton LS300 Scanner & Adapter	750
SummaSketch 12x12	378
SummaSketch 12x18	635

PRINTERS*

NEC	
P2200 170/55	345
P5200 265/90	530
P5300 Wide	650
LC890 Postscript Laser Printer	3190
PANASONIC (New Models Listed)	
1180 192/38	189
1191 240/48	235
1124 192/63	329
1592 220/38	390
1595 290/51	449
1524 240/80	545
OKIDATA	
ML390 270/90	465
ML391 270/90	645
ML320 300/62	330
ML393 450/120	995
ML321 300/62	479
ML393C 450/120	1069
HEWLETT PACKARD	
Deskjet	690
Laserjet II	1720
Font Cartridges Call Memory Upgrades ..	Call
Laserjet IID Duplex Laser Printer	2995
TOSHIBA	
321SL 216/72	469
341SL Wide Carr.	599
351SX 360/120	937
Express 311	385
CITIZEN	
120D 120/25	149
180D 180/29	170
MSP40 240/40	295
T224 200/132	579
DICONIX	
150P 150/50	305
300WP 310/73	479

PANASONIC KX-PI124

24 Pin 192CPS Draft 63CPS Letter Quality



\$329

PC BRAND-YOUR #1 LAN SOURCE!



Call for Custom Configurations

NOVELL NETWORKING

NOVELL	
4 User ELS 286 Level 1	\$450
8 User ELS Level II	939
Advanced Netware 286 V2.15	1850
SFT Netware 286 V2.15	2295
Disc Coprocessor Board	379
NE2000 Ethernet File Server Board	399
NE1000 Ethernet Card	299
RXNET	299
TIARA Lowest Priced Lancards	Call
GATEWAY (PC Magazines Editors Choice)	
G/Ethernet AT	\$419
G/NET	259
WESTERN DIGITAL	
Ethercard+A for PS/2	\$320
Starcad+	233
Ethercard+ w/Novell Drivers	233
STANDARD MICRO	
ARCNET Passive Hub	\$72
ARCNET Active Hub	409
PC120 ARCNET BOARD New ECA compat	135
PC260 TWISTED PAIR ARCNET CARD	130
PC300-WS 16 Bit Work Station Board	389
PC300-PS 16 Bit File Server Board	479

I/O CARDS

AST Rampage 286 w/512K	395
INTEL Aboveboard Plus w/512K	419
INTEL Inboard 386 for PC w/IMB	799
INTEL Inboard 386 AT	1019
DIGIBOARD Smart 8 Port Serial Card	Call
PC BRAND	
1/O=II For AT's Ser/Par/Game	\$45
1/O=II For XT's Ser/Par/Game/Clock	45
2MB EEMS for XT's w/OK LIMS 4.0	95
2MB EEMS for AT's w/OK LIMS 4.0	95
3MB Multifunction-Memory for AT's	110
Serial/Par/Game/Software w/OK	

PC BRAND™

Free Freight
30-Day Money-Back Guarantee
Toll-Free Service and Support
No Credit Card Surcharges

We carry over 10,000 different name brand products. Call for prices on products not listed

FAX MACHINES/CARDS

SHARP	
FO220	989
FO420	1299
QUADRAM	
JT FAX 4800	265
JT FAX 9600	549
MURATA	
M1200	679
M1600	879
TOSHIBA	
TSH3300	1395
TSH30100	1225
COMPLETE PC	
4800B FAX	249
9600B FAX	399

SERIAL MOUSE

High Resolution (2500DPI) Microsoft Compatible
With Free PC Paintbrush



\$40

PLOTTERS

CALCOMP	
1023	\$3800
1042	7499
1043	6499
1044	10200
HOUSTON INSTRUMENTS	
DMP41, DMP42, DMP52	Call
DMP52MP, DMP61, DMP62	Call
ROLAND	
DXY885, DXY990, DPX2000	Call

*Over-sized Monitors, Laser Printers, Laptops and Plotters are excluded from free freight.

To Order Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX#312-226-6841

PC Brand, Inc. 954 West Washington Street, Chicago, IL 60607 1-800-722-7263. We are open Monday thru Friday: 8am to 6pm CST. VISA, MasterCard, Discover, Checks, and Approved P.O.s are Accepted. Prices subject to change. For Order Status and Customer Service Inquiries Call: 1-800-662-SERV

CIRCLE 311 ON READER SERVICE CARD

Mother Nature Can Teach Us A Lot About Hard Disks.

It can happen with no warning. The sky goes dark and then it's there. A whirling funnel that destroys everything in its path, leaving little or nothing that can be retrieved. Just the way that disaster can strike your hard disk, scattering your data to the wind.

Virtually nothing is safe from a tornado, but fortunately there is a way to protect your hard disk data from a crash.

It's called FASTBACK PLUS. And though you can find cheaper programs, you won't find a better one, at any price.

With FASTBACK PLUS, daily incremental backups can take as little as a minute a day. In fact, backing up a full 10 megabytes on your hard disk takes only about 4 minutes*. And that makes FASTBACK PLUS the world's fastest backup program.

*With PC XT or equivalent.
XT machines may take longer.

And now, with version 2.0, there are more features than ever. While supporting DOS 3½ or 5¼ inch floppies, it simultaneously reads your hard disk as it writes data to floppies, tape, cartridges or any other logical DOS device. With data compression, it cuts the number of backup disks in half. Plus, there's a unique "restore estimate" feature that tells you what disks to use, and warns you if there isn't enough room left on your hard disk. And version 2.0 is easier than ever to use. So easy, and so fast, you actually *will* use it. Every day. And that's the whole point. But you

don't have a minute to lose. Your hard disk may be brewing up a storm right now. Protect it with FASTBACK PLUS, before it's too late.

A Minute A Day Keeps Disaster Away

Best of 1988
PC Magazine
Best Buy 1988
PC World
Award of
Distinction
BYTE



Edward R. Degginger/Bruce Coleman Inc.-NY

Fifth Generation Systems, Inc.
11200 Industriplex Blvd.
Baton Rouge, LA 70809
(800) 873-4384, (504) 291-7221

This product is in no way associated with or has origin in Fisher Scientific or Allied Corporation.

Users of versions prior to Fastback Plus V2.0 can call (504) 291-7681 for upgrade information.

CIRCLE 286 ON READER SERVICE CARD

Operating Environments ♦ Charles Petzold

File Options Arrange Window Exit

OS/2

With the OS/2 Presentation Manager, IBM and Microsoft have created a graphical user interface that will help bring the PC into the modern age. Are you ready to be carried along with it?

The Truth About Presentation Manager

OS/2 windowed command

This is a story that is not about what it appears to be about. It may seem like a story about an enhancement to an operating-system software product, but it's really not. There is no reason to tell you about a product that you probably won't purchase this year or even next year. By the time you purchase this product—and I have no doubt you eventually will—you'll have a later version than the one I describe

DOS

OS/2



■ PRESENTATION MANAGER

here. Some things I say in this article may no longer be true. Other things will be very obvious to you.

This story is really about the future of PC application software, the applications that you'll be using for much of the next decade. These applications will probably be written for, and will run under, the OS/2 Presentation Manager.

Like all operating systems, OS/2 is meaningless in itself. The support of application programs is its primary function. OS/2 is a relatively new operating system, and the Presentation Manager (included for the first time in OS/2 1.1) is newer still. Obviously, most applications for the Presentation Manager have not yet been written or even conceived.

When these applications become available, I think you'll discover that they are better than what you're using now. They will be easy to learn but at the same time very powerful; visually attractive but also visually interactive; fun to use yet designed for serious work.

Making possible this new generation of PC application software is what the OS/2 Presentation Manager is all about.

AGUI FOR OS/2 The Presentation Manager is a graphical user interface (or GUI) for OS/2. Many concepts of the GUI were originally developed at Xerox's Palo Alto Research Center (PARC) and first successfully brought to small computers with the Apple Macintosh. The GUI has come to be regarded as the state of the art in user interfaces and will probably be common on computers (both small and large) produced over much of the next decade.

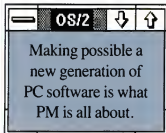
Typically a GUI displays multiple programs in separate windows on the screen. Users can move these windows around, resize them, and easily switch among the programs. The programs have a consistent user interface that makes use of pull-down menus, dialog boxes, and graphical objects such as scroll bars and buttons.

Programs running under a GUI use graphics for all screen output. This makes possible the display of text in different fonts and sizes, as well as the easy integration and manipulation of text and graphics. The use of graphics results in a richer and denser information content than is possible in character mode.

Graphical user interfaces commonly support a secondary user-input device, most often a mouse. The mouse provides an easy way for the user to switch among programs, manipulate windows, and indicate program options.

Users generally find a graphical user interface easy to learn. The GUI establishes a consistency in the user interface that allows knowledge of one application to carry over into the next. Ease of operation becomes increasingly more important as the use of PCs extends to less-sophisticated and more-casual users. Of course, power users also benefit. If the basic functions of a program are trivial to learn, more time can be spent on the more-difficult features (such as macro languages).

The Presentation Manager makes its



debut in OS/2 1.1. Its absence from OS/2 1.0 (released in December 1987 and discussed in "OS/2: A New Beginning for PC Applications," *PC Magazine*, April 12, 1988) may indicate that the Presentation Manager has been "tacked on" to the base operating system. But it's more accurate to see the Presentation Manager as an integral part of OS/2. In this sense, OS/2 1.1 is the first real version of OS/2, while OS/2 1.0 was an unfinished interim product. The Presentation Manager is the primary application environment of OS/2. The future applications that come to characterize the operating system will be written for the Presentation Manager environment.

OS/2 is being developed by IBM and Microsoft working under a joint development agreement. Both companies always intended for the new operating system to support some type of multitasking windowing environment, but at first they did not see eye to eye on the form this interface

would take. The Presentation Manager is a result of negotiation, collaboration, and a merging of software technologies.

STRANGE BEDFELLOWS Like politics, the computer industry sometimes makes strange bedfellows. It's hard to imagine two companies more different than IBM and Microsoft, and harder still to believe that any codevelopment between these two industry giants could work at all, let alone yield a worthwhile product. But in a classic example of synergy, the Presentation Manager turned out to be superior to anything either company could have created by itself.

IBM (bigger than Microsoft) got to name the product. "Presentation Manager" is a pretty klunky name all right, but that's IBM. The Presentation Manager includes a sophisticated vector-graphics programming interface, one of the most powerful graphics systems ever brought to a personal computer. And that's IBM, too.

Much of the windowing and user interface technology in Presentation Manager comes from *Microsoft Windows*, a DOS operating environment that Microsoft introduced in 1985. The graphics system in Presentation Manager includes some raster graphics and bitmap support (in addition to the IBM vector graphics technology) that also comes from *Microsoft Windows*.

In software technology, the Presentation Manager combines the best that IBM and Microsoft have to offer. The involvement of both companies in the product is also beneficial for more-practical reasons. Although Microsoft has succeeded in making *Windows* a GUI standard for DOS, this has been a long and laborious process. The endorsement of IBM helps ensure that OS/2 and the Presentation Manager will become industry standards more quickly.

But IBM could not have done it alone. In recent years IBM, working by itself, has had great difficulty establishing standards in either software (witness *TOPView*, IBM's nongraphical windowing environment) or hardware (the Micro Channel architecture of the PS/2). Fear that IBM wants to move to proprietary hardware and operating systems inhibits industry acceptance of anything from IBM that is not built with the concept of open architecture.

The involvement of Microsoft helps to establish OS/2 as an industry standard rather than an IBM proprietary product. Microsoft will be licensing OS/2 and the Presentation Manager to other hardware manufacturers that will adapt it to their own hardware.

IBM's version of OS/2 1.1 was released on the last day of October 1988. Other hardware manufacturers are expected to follow with their versions of OS/2 1.1 during 1989.

APPLICATIONS ON THE HORIZON

Of course, it makes little sense for most users to consider moving from DOS to OS/2 until a sufficient number of Presentation Manager applications become available. Some applications are expected this year, but OS/2 probably won't become viable for most users until 1990 or 1991.

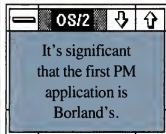
Some of the early Presentation Manager programs will be applications now available for *Windows*. These include Aldus's *PageMaker* and *MicroSoft Excel* (two programs originally developed for the Apple Macintosh) and several CAD products from Micrografix, including *Designer*. The Presentation Manager versions of these programs will probably show better performance than the *Windows* versions owing to increased memory space, better memory management, and more-efficient multitasking under OS/2.

Microrim and Oracle have both demonstrated early versions of Presentation Manager database products, and Ashton-Tate plans a Presentation Manager version of *dBASE*. In the spreadsheet arena, Lotus Development Corp. plans to introduce *1-2-3/G*, a Presentation Manager version of the best-selling spreadsheet program. It will have some competition from *MicroSoft Excel*, as well as Presentation Manager versions of Borland's *Quattro* and Computer Associates's *SuperCalc*.

Word processing, too, reaps benefits from a graphical user interface by gaining a true WYSIWYG display. Although Microsoft and WordPerfect have not officially announced plans for the Presentation Manager, it's quite likely that both companies are working on something. Presentation Manager versions of *MultiMate*, *DisplayWrite*, and *WordStar* are also expected.

The first company to release a Presentation Manager application is Borland International, with *SideKick* for Presentation Manager. Although the program was not available at press time, demonstrations of this new *SideKick* have been very impressive. It is quite different from the old program and introduces some powerful features. For example, the calculator "paper tape" is actually a one-column spreadsheet that can be edited (with changes rippling through the calculation), saved, and retrieved. The phone directory creates a *Paradox* database.

The role of Borland in developing the first commercially available Presentation Manager application is significant: historically, Borland has been a strong critic of *Microsoft Windows*. But like many other



companies, Borland apparently sees the Presentation Manager as the environment that will support future PC software.

HARDWARE REQUIREMENTS The hardware necessary to run the OS/2 Presentation Manager has been the subject of much confusion and misinformation. I will try not to add to this confusion, but I think it would be helpful to make a distinction between "minimum" and "practical" requirements. The minimum requirements are what you need to run OS/2 1.1 with no regard to performance, whereas the practical requirements are what you need to achieve adequate performance, operational ease, and reasonable video display fidelity. The minimum requirements to run OS/2 1.1 are an 80286- or 80386-based personal computer with 1MB of memory, a graphics video board and display, and a 10MB hard disk.

IBM's version of OS/2 1.1 supports all

its 80286- and 80386-based PCs (the PC AT, the XT Model 286, and PS/2 Models 50 and above). Other vendors' versions of OS/2 1.1 will support their 80286- and 80386-based machines. Obviously, OS/2 will run better on a high-speed 80386 machine than on a low-speed 80286. But so will most other software.

The 1MB minimum memory requirement is probably the lowest OS/2 memory requirement you've ever seen, but it's no misprint. OS/2 will boot and run in 1MB and will even allow a 256K DOS compatibility mode. I've done it, and it works.

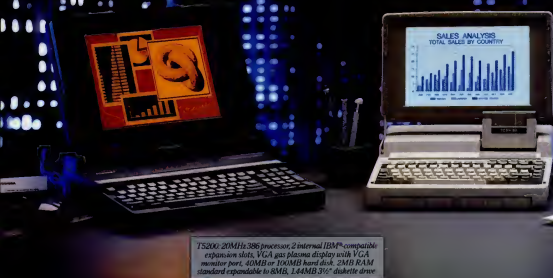
Running OS/2 1.1 under 1MB of memory is equivalent to living in an apartment with 3 by 6 feet of floor space and a large closet. You may not be comfortable, but you could keep most of your possessions in the closet and take out only what you need at any one time. In this analogy, the large closet is your hard disk. OS/2 implements virtual memory, which means that if it needs more memory than is physically available, it will use hard disk space to temporarily store data in memory. When this data is needed again, OS/2 will save something else in memory on the hard disk and swap in what it needs. Only when the hard disk fills up will OS/2 applications actually run out of memory.

While OS/2 1.1 may run under 1MB, performance is intolerable. IBM recommends a more practical requirement for the operating system: 2MB with another 512K if a DOS compatibility mode is used. But 4MB offers a more comfortable environment for the operating system and a couple of applications running concurrently.

Beyond this, estimations of practical memory requirements get a little tricky. It depends on the size of the applications you run, how many you have loaded at the same time, and what performance degradation you are willing to tolerate.

The performance problems will occur mostly in switching among programs. When a program has been loaded into memory but is not doing anything, OS/2 can discard the program's code segments and swap its data segments to disk. The program then takes up very little memory. But when you switch to the program to use it, the code and data segments must be reloaded. This results in a disk access. If you want to keep several large programs load-

Power



T5200: 20MHz 386 processor, 2 internal IBM®-compatible expansion slots, VGA gas plasma display with VGA monitor port, 40MB or 100MB hard disk, 2MB RAM standard expandable to 8MB, 1.44MB 3½" diskette drive

At Toshiba, we're not only committed to making computers more portable, but also to making portables more powerful.

Which is why, in our effort to constantly improve and refine our machines, we've added three new computers to what is already the most complete family of truly portables available.

Each designed to be powerful enough to take on the increasingly complex tasks that face today's sophisticated PC users.

First, the T1600 which weighs under 12 pounds and which is the fastest battery-

powered computer we've ever made.

Second, the T3100e, the successor to our most popular machine—the T3100/20. We've made it nearly two pounds lighter and a lot faster—we've even added expansion capabilities. About the only thing we didn't add was more size.

T1600: Battery-powered 286/12MHz, coprocessor socket, 20MB hard disk at 27mb/sec, 1.44MB 3½" diskette drive, 1MB RAM expandable to 5MB, detachable backlit EGA compatible LCD, removable rechargeable battery pack.



Toshiba is the world leader in truly portable PCs and manufactures a complete line of high quality dot matrix and laser printers. For more information call 1-800-457-7777. All Toshiba PCs are backed by the Exceptional Care program (no cost enrollment required). IBM is a registered trademark of International Business Machines Corporation. Model T5200 has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of FCC has been obtained.

Surge.



And finally, the T5200, which has enough power to replace virtually any desktop PC.

But we haven't just concentrated on power and portability. We've also constantly looked for ways to make our machines more durable, more reliable, and easier to use—down to the 800 number our customers can call for help with any technical question that might come up.

We figure that's what our users demand.

And it's by anticipating the growing needs of our users that we have continually found ways to make our machines weigh

less and do more. So you can work wherever you want and however you want.

All of which might make it tempting for some people to abandon their desktop for the convenience of portability. Go ahead.

We've given you the power to do it.

T3100c: 12MHz 286 with 80287 co-processor socket, internal half-length IBM slot, 20MB hard disk with 27 msec access, 1MB RAM expandable to 5MB, gas plasma display, 1.44MB 3 1/2" diskette drive.



In Touch with Tomorrow
TOSHIBA

Toshiba America Inc., Information Systems Division

CIRCLE 321 ON READER SERVICE CARD

■ PRESENTATION MANAGER

ed and you won't tolerate any disk access when switching among them (and if RAM prices drop to a reasonable level), you'll want at least another couple of megabytes.

People will run OS/2 with various amounts of memory depending on the applications they run, their work habits, the performance they want from the system, and the thickness of their wallets. Systems will range from 3MB on up, probably averaging in the 6 to 8MB region a few years from now.

This may sound like a lot, but it's following a normal trend. In 1980, before the IBM PC was introduced, 64K was normal on CP/M machines. By 1985, PC users were butting up against the 640K memory limit of the PC architecture. Six megabytes for 1990 is right in line.

The initial release of IBM's OS/2 1.1 has graphics device drivers for the Enhanced Graphics Adapter (EGA), Video Graphics Array (VGA), and the IBM 8514/A. Color Graphics Adapter (CGA) support is expected in a set of device drivers that IBM is scheduled to distribute at the end of February 1989. (The IBM monochrome board is not capable of graphics and thus cannot be used with the Presentation Manager.)

In time, manufacturers of other video boards are expected to develop and distribute their own device drivers for Presentation Manager, just as they do today for *Microsoft Windows*. From the perspective of application programs, the Presentation Manager has a device-independent graphics interface. If a device driver is available for a particular video display adapter, all programs written for the Presentation Manager can use it without any changes.

The CGA (black-and-white with 640-by-200-pixel resolution) is the minimum requirement for a Presentation Manager video board. But the practical requirement is an EGA, with 640 by 350 resolution and 16 colors. Higher on the scale is a VGA, increasing the resolution to 640 by 480.

Because the Presentation Manager works with graphics, performance will be improved by video boards with hardware-assisted drawing. The first such board with a Presentation Manager driver is the IBM 8514/A (1,024-by-768-pixel resolution with 256 colors). This is not the last word in video adapter technology.



Figure 1: When OS/2 1.1 boots from the hard disk, it switches the display to a graphics mode and loads several programs. The *Start Programs* window in the center of the screen allows you to choose a program to run. The icons at the bottom of the screen represent the DOS compatibility session, the *Printer Spooler Queue Manager*, and the *Task Manager*.

For a hard disk, the minimum requirement is 10MB. But OS/2 1.1 itself occupies 8MB of hard disk space, and you'll want to reserve a couple of megabytes for disk swapping, so this is a real minimum and leaves no room for applications! A practical requirement would depend on the size of the applications you'll be using. A 30 or 40MB hard disk will be fine for many users, but 80 to 120MB would be safer.

You'll also want a mouse for the Presentation Manager. While the system has a complete keyboard interface (and most Presentation Manager programs will also), a mouse certainly adds to the ease of use.

Another desirable hardware option is a printer capable of graphics. As with video boards, the device-independent graphics interface of the Presentation Manager will allow all Presentation Manager programs to use a printer for which a device driver is available. The initial release of OS/2 1.1 included only one device driver that supports the IBM Proprinters I and II, but this deficiency is obviously only temporary. For example, a PostScript driver for the Presentation Manager is expected soon.

FIRST ENCOUNTERS Assuming that OS/2 1.1 is the current version when you decide to move from DOS to OS/2 (which will probably not be the case), here's what you'll find when you open the box and install the system.

The IBM OS/2 1.1 package consists of five high-density diskettes and one binder containing several manuals. The package

is available with either 5¼-inch diskettes (for the IBM PC AT and the XT Model 286) or 3½-inch diskettes (for the IBM PS/2 Models 50 and above). The documentation includes a 159-page *Getting Started* manual, a 281-page *Using the System* manual, a 176-page *Command Reference*, and a 54-page *System Editor* manual (covering a new full-screen text editor).

Installation of OS/2 1.1 on a hard disk is fairly easy. You boot up the installation diskette and follow the instructions. This takes about 20 minutes. Most files on the distribution diskettes are in a packed format, so it would be difficult to install OS/2 1.1 without the installation program. The installation creates several subdirectories on your hard disk, copies files from the diskettes, and unpacks the files.

After the installation you can boot OS/2 1.1 from your hard disk. Midway through the boot process, the screen switches to a graphics mode. A window and several icons appear, as shown in Figure 1. This is the Presentation Manager session.

The program in the center of the screen is labeled *Start Programs*. This window lists the programs currently installed to run under OS/2. You can run one of these by moving the reverse-video highlight with the keyboard and pressing Enter, or by using a mouse to double-click (pressing the mouse button twice in succession) the program you want to run.

The programs installed on the *Start Programs* window are organized in "groups." *Start Programs* initially displays the *Main*

Group, but you can switch to the Utility Programs Group from the menu. The menu also lets you add and delete groups and add and delete installed programs within a group.

The Main Group includes two items labeled "OS/2 full-screen command prompt" and "OS/2 windowed command prompt." These start up the OS/2 CMD.EXE program (the equivalent of COMMAND.COM in DOS) for entering OS/2 commands or running OS/2 programs from the command line prompt. You can run CMD.EXE in either a separate full-screen character-mode session (as in OS/2 1.0) or in a text window in the Presentation Manager session. Figure 2 shows several copies of CMD.EXE running in different windows.

As is the case with CMD.EXE, most programs written for OS/2 1.0 can be run in their own full-screen sessions or in text windows in the Presentation Manager session. OS/2 1.0 programs cannot take advantage of Presentation Manager graphics and other aspects of the user interface. Programs prohibited from running in a text window are those that write directly to video display memory and those that install monitors or subsystems.

Using either the keyboard or the mouse, you can switch among windows, move or resize windows, "maximize" a window to fill the whole screen, "minimize" a window to be displayed as a small icon, or "close" the window (which terminates the program).

The icon at the lower right corner of the screen is the Task Manager. You can display the Task Manager window at any time by pressing Ctrl-Esc. (If you're currently in a character-mode session, OS/2 will switch to the Presentation Manager session when you press Ctrl-Esc.) Within the Presentation Manager session, you can also enable the Task Manager by double-clicking the icon with the mouse.

The Task Manager displays the names of all currently running programs, as shown in Figure 3. You can switch to one of these programs by using either the keyboard or the mouse. For a program running in a character-mode session, OS/2 will switch to that session. For programs in the Presentation Manager session, the program that you switch to will be moved to

the top of all the other windows.

The icon at the lower left corner of the screen is labeled DOS. Double-clicking this icon with the mouse (or selecting "DOS command prompt" from the Task Manager) switches to the full-screen DOS compatibility mode session, which you can use for running most DOS programs. The remaining icon displays a little image of a printer. This is the OS/2 print spooler program. Its window lists all print jobs currently queued or being printed.

Three other Presentation Manager programs are included with OS/2 1.1 and can be run from the Start Programs window. *Introducing OS/2* is a short tutorial that takes you through the basics of the interface. The Control Panel (listed in the Utility Programs group) lets you set the system date and time, change system defaults (such as the screen colors), and install printer drivers and font files.

The File System (shown in Figure 4) is the most sophisticated Presentation Manager program included in OS/2 1.1. This program displays a directory tree and lets you open multiple directory windows that list the files in the directory. Menu commands let you perform the equivalents of many OS/2 file commands. Some file operations can be performed without help from the menu. For example, you can move files from one directory to another by opening two directory windows, selecting the files you want to move, and then dragging the files with the mouse to the destination directory window.

At almost any time, help is available by pressing F1. Help windows display text in the default Presentation Manager font, an easy-to-read, proportionally spaced Helvetica. A help window from the File System is shown in Figure 5.

Although the programs included in OS/2 1.1 are functional and do what they're supposed to do, some of them—in particular, Start Programs, Task Manager, File System, and Control Panel—are not quite ready for prime time. They are certainly not shining examples of what can be done in the Presentation Manager and still need some work before they function in a truly natural and intuitive fashion.

For example, the Task Manager and Start Programs windows, which perform completely different functions, look very

similar and often list some of the same programs, which makes them easy to confuse. The installation of printers in the Control Panel is a total disaster. The File Manager has some good ideas, but I get frustrated every time I try to use it.

The initial release of OS/2 1.1 also lacks some essential pieces, such as graphics printer drivers for anything except the IBM Proprinters I and II. (As of this writing, some additional printer drivers for IBM printers are expected from IBM shortly.) Microsoft is working to get printer drivers written for non-IBM printers, but it is still not clear to me how these drivers will be distributed.

For most users, these problems are irrelevant. The deficiencies are so obvious that I'm sure everyone at Microsoft and IBM knows of them. By the time most users get their hands on the Presentation Manager, these programs will be fixed.

What is much more important, of course, is the Presentation Manager API (application program interface). This is what programmers must work with to write applications for the Presentation Manager.

THE PROGRAMMER'S VIEW The primary purpose of the OS/2 Presentation Manager is to provide a platform for applications written specifically to its API. While most users will not encounter the Presentation Manager until these programs are written, programmers must look at the Presentation Manager much earlier. Obviously, the applications that they write will determine how users will eventually encounter the Presentation Manager.

Programmers approaching the Presentation Manager API as their first graphical user interface will find a system that is very big, initially confusing, and conceptually difficult. The API is big because it adds about 500 function calls to OS/2. These are divided almost equally between the two main components of the system: the windowing and user interface component, and the Graphics Programming Interface (GPI).

The Presentation Manager API is initially confusing and difficult because, like most graphical user interfaces, it is based on an "event-driven" or "message-driven" model. This differs considerably from

Last minute taxes?

- 3 1/2" format available from u.s. Specify when ordering.
 - package includes both 5 1/4" and 3 1/2" disks.
 - 3 1/2" format available from manufacturer by request. Call us for details.
- CP—copy protected. NCP—not copy protected.

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time.

- Aldus ... NCP
- PageMaker 3.0 ... call
- Alpha Software ... NCP
- AlphaWorks 1.0 (integrated package) ... 115.
- ALPHAthree 1.0 (dBase file compatible) ... 219.



Epson ... 1 year
FX-100 Printer—Feature laden 136 column, 9 pin dot-matrix printer. Smart-park mode loads single sheets without removing continuous form paper. Prints 264 cps draft (12 cpi mode) and 54 cps letter quality (12 cpi mode) ... call

- American Smell Business Computers
- Design CAD 3.1 (NCP) ... 159
- Design CAD 3D 1.1 (NCP) ... 159
- Application Techniques ... NCP
- Pizazz Plus 1.2 ... 75.
- Ashton-Tate ... NCP
- dBASE IV 1.0 ... call
- MultiMate Advantage II 1.0 ... 299.
- Autodesk
- AutoSketch Standard 1.04 ... 55.
- Barron's ... CP
- SAT (test preparation program) ... 35.
- Best Programs ... NCP
- Label Master 3.1 (mailing label program) ... 29.
- Bible Research ... NCP
- The Word 4.2 (King James version) ... 159.
- The Word 4.2 (New International version) ... 159.
- Bioc Publishing ... NCP
- Form Tool 2.01 ... 55.
- Form Filler 1.5 ... 89.



Broderbund ... CP

□ Jetfighter—Choose among three different fighting aircraft—an F-14 Tomcat, F-16 Fighting Falcon, or F/A-18 Hornet. Encounter Soviet Mig aircraft. Over 30 missions are included; supports land or carrier-based attacks ... \$35.

- Personal Lawyer 2.0 ... 39.
- PopDrop 3.1 ... 32.
- Portland International ... NCP
- Superkey 1.1 ... 69.
- Turbo C 2.0 ... 99.
- Turbo C Professional Pack (w/Debugger) ... 169.
- Turbo Pascal 5.0 ... 99.
- Turbo Pascal Professional Pack (w/Debugger) ... 169.
- Prolog 2.0 ... 99.
- Turbo Assembler & Debugger 1.0 ... 99.
- Sidekick Plus 1.0 ... 135.
- Sprint 1.0 ... 135.
- Quattro 1.0 w/SQZPlus 1.0 ... 165.
- Paradox 3.0 ... call
- Paradox OS/2 1.0 ... 479.
- Bourbaki ... NCP
- 1DIR + 3.0 ... 49.
- Bridgeaway Publishing ... NCP
- FastTrax 3.9 ... 35.
- Broderbund ... CP
- Print Shop 2.41 (incl. Graphics Library 1) ... 39.
- Memory Mite 3.01R (NCP) ... 45.
- Chipsoft ... NCP
- TurboTax Personal/1040 6.0.1 ... 45.
- State Packages Personal/1040 6.0 ... each 32.
- Chronos Software ... NCP
- Who's What's When (people, projects, time) ... 119.
- Core International ... NCP
- CoreList 2.0 ... 95.
- Crosstalk Communications ... NCP
- Remote! 1.01 ... 95.
- Crosstalk XVI 3.7 ... 95.
- Crosstalk MK 4.1.1 ... 124.
- Dac Software ... NCP
- Dac: Easy Payroll 3.0 ... 59.
- Dac: Easy Light 1.0 ... 45.
- Dac: Easy Accounting 3.0 ... 59.
- Datascram ... NCP
- Proccom Plus 1.1B ... 49.
- Delrina Technology ... NCP
- PerFORM 1.0 ... 159.

5th Generation ... NCP

- Fastback Plus 2.01 ... \$109.
- Fox Software ... NCP
- Foxbase Plus 2.1 (single user) ... 209.
- Funk Software ... NCP
- Sideways 3.21 (creates wide printouts) ... 42.
- Worksheet Utilities 1.0 (7-2-3 utilities) ... 59.
- Always 1.0 ... 85.
- General Information ... NCP
- Hot Line Two 2.0 ... 49.
- Generic Software ... NCP
- Generic CADD Level 2 (now includes DeskConvert and Pen Plot) ... 89.
- Generic CADD Level 3 (now includes Dot Plot and DeskConvert) ... 179.
- Estimator ... 159.
- Basic Home Design 3.0 ... 35.
- CADD Starter Kit (includes Level 2) ... 119.
- Great American Software ... NCP
- One Write Plus Master 2.01 (General Ledger) ... 129.
- A/R, A/P, or Payroll 2.01 ... each 129.
- Harvard Associates ... NCP
- PC Logo 3.0 ... 59.
- Hayes ... NCP
- Smartcom II 3.0 ... 89.
- Hillgreave Software ... NCP
- HyperACCESS 3.31 ... 89.
- Individual Software ... NCP
- Typing Instructor Encore 2.13 ... 26.
- Professor DOS 2.51 (with Smartguide) ... 27.
- Intuit ... NCP
- Quicken 2.0 ... 35.
- Javelin ... NCP
- Javelin Plus 2.02 ... 249.
- Lifetree ... NCP
- Volkswriter 4 ... 159.
- Lotus ... NCP
- Agenda 1.0 ... 289.
- 1-2-3 2.01 (upgrade free to version 3.0) ... call
- Symphony 2.0 ... 459.
- Magellan 1.0 ... call
- Freelance Plus 3.0 ... 345.



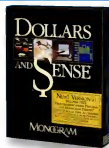
NorthEdge Software ... NCP

□ Timeslips III 3.3—Turns time into money for your service business with its accurate software timer, custom billing system, powerful productivity analysis and accounts receivable reports ... \$169.

For IBM Personal Computers exclusively.

PC CONNECTION®

A game that relaxes?



Monogram ... NCP

❑ Dollars & Sense 3.1—Unscramble your nest egg and meet your tax deadline with this program's powerful money management abilities ... \$105.

MECA ... NCP

- ❑ Checkwrite Plus 1.0 29.
- ❑ Managing Your Money 5.0 119.
- ❑ Andrew Tobias' Tax Cut 1040 49.
- ❑ Meridian Technology ... NCP
- ❑ CarbonCopy Plus 5.0 (2 required) 115.
- ❑ Micro Logic ... NCP
- ❑ Tornado 1.8 55.
- ❑ Microlytics ... NCP
- ❑ GOFer 1.0 (text retrieval system) 45.
- ❑ Wordfinder 4.0 (electronic thesaurus) 35.

MicroPro ... NCP

- ❑ WordStar Professional Release 5 259.
- ❑ Microsim ... NCP
- ❑ R-BASE for DOS (version 2.1) 449.

Microsoft ... NCP

- ❑ Learning DOS 2.0 (for any DOS version) 35.
- ❑ Windows 286 2.1 69.
- ❑ Works 1.05 98.
- ❑ Windows 386 2.1 129.
- ❑ World 5.0 call
- ❑ Excel 2.1 (requires 80286/80386 CPU) 239.

LANGUAGES

- ❑ Quick BASIC 4.5 69.
- ❑ Quick C 2.0 69.
- ❑ Macro Assembler 5.1 99.
- ❑ Basic Compiler 6.0 199.
- ❑ BC Compiler 5.0 299.

Monogram ... NCP

- ❑ Dollars and Sense 3.1 (w/Tax Advantage) 105.
- ❑ Nentucket Software ... NCP
- ❑ Clipper (Summer '87, d83 Plus compiler) 429.

New England Software ... NCP

- ❑ Graph-in-the-Box Release 2 75.
- ❑ GB-Stat 1.0 159.
- ❑ GB Analytic 1.0 105.

Nolo Press ... NCP

- ❑ WillMaker 3.0 35.
- ❑ NorthEdge Software ... NCP
- ❑ Timeslips III 3.3 169.

Owl International ... NCP

- ❑ Guide 2.0 143.

Paperback Software ... NCP

- ❑ VP-Info 1.4 \$65.
- ❑ VP-Planner Plus 2.0 145.
- ❑ VP-Expert 2.0 145.

Paul Mace ... NCP

- ❑ Nvelope 1.02 29.
- ❑ HTest—HFormat 2.0 49.
- ❑ Mace Utilities 5.0 (DOS utilities) 55.
- ❑ Mace Gold 1.0 79.

PC Support Group ... NCP

- ❑ Lightning 4.82 39.
- ❑ Lucid 3-D 2.0 75.

Personica ... NCP

- ❑ SmartNotes 2.0 49.
- ❑ SeeMORE 1.02 49.
- ❑ Look&Link 1.01 59.
- ❑ Ultravision 1.1 79.

Peter Norton ... NCP

- ❑ Norton Editor 1.3 39.
- ❑ Norton Commander 2.0 45.
- ❑ Advanced Utilities 4.5 79.
- ❑ Dan Bricklin's Demo Program 2 99.

Quartadeck ... NCP

- ❑ Expanded Memory Manager 4.2 39.
- ❑ DESQView 2.2 79.
- ❑ DESQView 386 1.0 115.

Reference Software ... NCP

- ❑ Grammatik III 1.07 (electronic proofreader) 52.
- ❑ Reference File 1.0 (pop-up DB manager) 49.

Relay Communications

- ❑ Relay Gold 3.0 149.

Revolution Software ... NCP

- ❑ VGA Dimmer 2.01 (screen saver) 19.
- ❑ Cruise Control 3.02 39.



Nolo Press ... NCP

- ❑ WillMaker 3.0—Prepare your own valid Last Will and Testament without a Lawyer. Follows a simple question and answer format, and allows you to update your will whenever necessary ... \$35.

1-800/243-8088

MMC
6 Mill Street
Marlow, NH 03456

PC Connection
6 Mill Street
Marlow, NH 03456

SALES 603/446-7721 FAX 603/446-7791

Rightsoft ... NCP

- ❑ Rightwriter 3.0 \$54.
- ❑ Simon & Schuster ... NCP
- ❑ Typing Tutor IV 33.

Softlogic Solutions ... NCP

- ❑ Software Carousel 2.02 49.
- ❑ Disk Optimizer 4.01 (w/Data Guardian) 45.
- ❑ FATCAT 1.0 call

SoftView ... NCP

- ❑ TaxView (for 1988 taxes) 69.

Software Publishing ... NCP

- ❑ Professional Plan 1.01 59.
- ❑ PFS: First Publisher 2.0 79.
- ❑ PFS: First Graphics 1.0 95.
- ❑ PFS: First Choice 3.01 99.
- ❑ Professional Write 2.0 125.
- ❑ Professional File 2.0 189.
- ❑ Office Writer 6.0 259.
- ❑ Harvard Graphics 2.12 299.
- ❑ Harvard Graphics Accessories Pack 299.
- ❑ Harvard Project Manager 3.0 439.



Microsoft ... NCP

- ❑ Word 5.0—New version of Word includes streamlined interface for creating better documents with less effort. Mix text, graphics, and spreadsheet data easily. "Print Preview" displays them exactly as they will appear on paper call

Spinnaker ... NCP

- ❑ Resume Kit 1.0 25.
- ❑ Splash 1.0 59.
- ❑ PinStripe Presenter 1.0 115.

Springboard ... NCP

- ❑ Newsroom Pro 1.0 45.
- ❑ Certificate Maker 34.

Symantec ... NCP

- ❑ SQZ!Plus 1.11 89.
- ❑ Q & A Write 1.01 135.
- ❑ Grandview 1.0 195.
- ❑ Q & A 3.0 (database, word processor) 235.
- ❑ Breakthrough Timeline 3.0 395.
- ❑ Spreadsheet Analyst 2.5 99.
- ❑ Think Tank 2.4NP 135.

T/Maker ... NCP

- ❑ Scripbook + 1.0 79.
- ❑ ClickArt Business Images 42.
- ❑ EPS (PostScript) Illustrations 79.

The XTREE Co. ... NCP

- ❑ XTREE Pro 1.1 69.

For IBM Personal Computers exclusively.

PC CONNECTION®

ALL ITEMS SUBJECT TO AVAILABILITY PRICES SUBJECT TO CHANGE WITHOUT NOTICE

A board to send faxes?



Great American Software ... NCP

One-Write Plus 2.01—Top-rated accounting package written especially for small business. Easy set-up and operation makes sending invoices and making payments a breeze. Reports monitor cash flow and profit. \$129.

TOPS ... NCP

Flashcard (Apple Talk network card; 1 year warranty) ... 169.
NetPrint 2.0 (share printers) ... 119.
TOPS 2.0 ... 119.
TOPS Repeater (extends network) ... 132.

Traveling Software ... NCP

Battery Watch 1.0 (3 1/2" only) ... 27.
LapLink Mac 2.0 (Mac PC transfer) ... 79.
LapLink Plus 2.1 ... 85.
ViewLink 1.0 (first product to link all your existing software programs and data) ... 95.
DeskLink 2.21 ... 99.

True BASIC, Inc. ... NCP

True BASIC 2.1 (now includes Runtime) ... 57.
3-D Graphics ... 45.
Vericomp ... NCP

SoftBytes 2.0 ... 35.
WordPerfect Corp. ... NCP
WordPerfect Library 2.0 ... 69.
WordPerfect 5.0 ... 239.
WordPerfect Office 2.0 ... 269.
WordPerfect Executive ... 129.

Wordtech ... NCP

DBXL 1.2 ... 119.

Xerox ... NCP

Ventura Publisher 2.0 ... call
XYQUEST ... NCP

XyWrite III Plus 3.54 w/A la Carte Menus ... 239.

RECREATIONAL/EDUCATIONAL

Accolade ... CP (reqs. graphics brd.)

Hardball (baseball simulation) ... 11.
TestDrive (driving simulation) ... 22.
Jack Nicklaus' 18 Greatest Holes ... 29.
Grand Prix ... 22.
Broderbund ... CP
Where in the World is Carmen San Diego? ... 25.
Where in the USA is Carmen San Diego? ... 25.
Where in Europe is Carmen San Diego? ... 29.
JetFighter (by Velocity) ... 35.

Electronic Arts ... CP (reqs. graphics brd.)

Chesmaster 2100 ... \$35.
Earl Weaver Baseball ... 32.
Life and Death (from Software Toolworks) ... 35.
Wasteland ... 32.
Skate or Die! ... 32.
Microprose ... CP
F-19 Stealth Fighter (requires CGA or EGA) ... 39.
F-15 Strike Eagle (requires CGA) ... 22.

Microsoft ... NCP


Flight Simulator 3.0 (reqs. graphics brd.) ... 35.

Mindscape ... CP

Gauntlet ... 29.
Paperboy ... 29.
Colony 1.0 ... 30.
Balance of Power 1990 ... 30.

One Step Software ... NCP

Golf Doctor 1.1 (improve your game) ... 33.
Golf's Best Pinetrush #2 4.0 (play the best) ... 12.
Golf Statkeeper 1.0 ... 27.
(includes USGA Handicapper)



Professional File

Software Publishing ... NCP
Professional File 2.0—Provides direct access to dBASE and 1-2-3 data along with file lookup and data validation. The only flat file database which lets you create custom applications without programming. \$189.

Parlor Software ... CP

Bridge Parlor 2.3 ... 49.
Sierra On-Line ... CP
(All require Hercules, CGA or EGA)

Leisure Suit Larry ... 25.
Leisure Suit Larry II ... 33.
Space Quest II ... 33.
King's Quest IV (512k version) ... 33.
King's Quest IV (256k version) ... 33.
Manhunter ... 33.
Police Quest ... 33.
Gold Rush ... 35.

Spectrum Holobyte ... NCP

GATO (submarine simulation) ... 12.
Tetris (addicting mind teaser) ... 24.
Falcon (F-16 simulation, reqs. graphics brd.) ... 32.
Stone & Assoc. ... NCP (reqs. graph. brd.)
Memory Master (ages 2 to 6) ... 22.
My Letters, Numbers, Words (2 to 6) ... 22.
2nd Math (ages 7 to 16) ... 27.

Sublogic ... NCP

Jet 2.1 (requires EGA or CGA) ... \$33.
Scenery Disks ... each 15.
Up Penscope ... 19.
True BASIC, Inc. ... NCP
Kernery/Kurtz Math Series ... 32.
XOR ... NCP
NFL Challenge 2.0 ... 69.

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years

I/O Mini 2 C/S/P ... 89.
SixPakPlus 64k C/S/P (upgrades to 576k) ... 129.
Advantage Premium 512k S/P ... 429.
RAMpage Plus 286 512k (for XT286/AT) ... 539.
RAMpage Plus MicroChannel 512k ... 539.

Computable ... 2 years

2-Position switch box ... 29.
3-Position switch box ... 39.

Cuesta ... 1 year

Datasaver 400 Watt (standby power backup) ... 459.

Curtis ... lifetime

Curtis Clip CC-1 ... 6.
Disk Holder DB-1 (holds 50 5 1/4" disks) ... 8.
3 1/2" Disk Holder DB-2 (holds up to 40 disks) ... 8.
Printer Stand PS-1 ... 18.
Smartmodem-to-PC Cable EC-7 (9 feet) ... 17.
Printer-to-IBM cable EC-6 (9 feet) ... 17.
Filtered SaleStrip SPF-3 ... 21.
Emerald SP-2 ... 36.
Ruby SPF-2
(6 outlets; EMI/RFI filtered; 6 ft cord) ... 55.
Ruby-Plus SPF-2 Plus
(w/FAX & modem protection) ... 69.



Revolution Software ... NCP

Cruise Control 3.02—Boost cursor speed. Stop cursor run-on. "Highly recommended", Jim Seymour, PC Week ... \$39.
VGA Dimmer 2.01—Screen saver for VGA, EGA, CGA, Hercules, Mono ... 19.

For IBM Personal Computers exclusively.

PC CONNECTION

Or connect you to Macs?

DCA ... 1 year	
Irma 2 (3270 emulation board)	\$729.
Irma 2 Micro Channel	729.
Epson ... 1 year	
We are an authorized Epson Service Center:	
FX-850 (80 col., 264 cps, 9 pin)	call
FX-1050 (136 col., 264 cps, 9 pin)	call
LQ-500 (w/\$25 rebate coupon)	295.
LQ-850 printer (w/\$50 rebate coupon)	call
LQ-1050 printer (w/\$100 rebate coupon)	call
LQ-2550 printer (136 col., 400 cps, 24 pin)	call
LX-800 printer (80 col., 180 cps, 9 pin)	179.
Printer-to-IBM cable (6 feet)	15.
Everax ... 1 year	
1200 Baud Internal Modem	79.
2400 Baud Internal Modem	149.
5th Generation ... 1 year	
Logical Connection 256k	479.
Logical Connection 512k	529.



Spinnaker Software ... NCP

□ **Resume Kit 1.0**—This kit contains everything you need to write, format, and print a truly professional resume that will look exactly the way you design it. ... \$25.

Hayes ... 2 years	
Personal Modem 1200 (with Smartcom EZ: 1 yr. w/try thru PC Connection)	special
Smartmodem 1200	289.
Smartmodem 1200B (with Smartcom II)	289.
Smartmodem 1200B (hardware only)	259.
Smartmodem 2400	429.
Smartmodem 2400B (with Smartcom II)	429.
Smartmodem 2400B (hardware only)	399.
Hercules ... 2 years	
Graphics Card Plus	189.
Intel ... 5 years	
2400B Modem (internal modem)	239.
2400B Modem 2 (internal modem for PS/2 Models 50/60/80)	269.
Inboard 386/PC w/1 Meg	599.
Inboard 386/PC Piggyback 4 Meg	1249.
Inboard 386/AT (req. installation kit)	139.
Inboard Installation Kit (specify computer)	419.
Above Board Plus 512k	469.
Above Board Plus 512k	469.
Above Board Plus I/O 512k	469.
Connection Coprocessor	769.



Epson ... 1 year

LX-800 Printer—A fast (180 cps draft—12 cpm mode) and affordable 80 column, 9 pin dot-matrix printer. Includes tractor feed and Epson's standard 1 year warranty. Great for home use or as second office printer. ... \$179.

2400 Baud Modem for Connection Coprocessor	229.
Visual Edge (improve the output of your HP Laserjet II)	449.
MATH COPROCESSORS	
8087 (for IBM PC & XT)	95.
8087-2 (8 MHz, for PS/2 Models 25 & 30)	139.
80287 (for AT & XT286)	149.
80287-8 (for 8 MHz 80286 machines)	219.
80287-10 (for PS/2 Models 50 & 60)	259.
80387 (for 16 MHz PS/2 Model 80)	399.
80387-20 (for 20 MHz PS/2 Model 80)	459.
Kensington Microware ... 1 year	
Masterpiece	94.
Masterpiece Plus	109.
Key Tronic ... 3 years	
101 Keyboard	99.
101 Plus Keyboard (enhanced layout)	99.
Kraft ... 5 years	
Three-button Joystick	33.
High Speed Joystick Adapter Card	25.
KYE International ... lifetime	
Dyna Mouse GM6+ (w/Dr. Halo III)	54.
Logitech ... lifetime	
Series 2 Mouse (for PS/2 50/60/70/80)	65.
HiPEZ Mouse (bus only)	89.
Mouse w/Print Show (bus or serial)	95.
ClearCase Mouse (serial only)	95.
ScanMan (hand held scanner)	219.
Magnavox ... 2 years	
14" VGA Monitor (9CM062)	389.
VGA Adapter (9AV610)	249.
14" VGA Monitor (9CM082)	449.
14" Hi-Res Monitor (9CM053)	389.

1-800/243-8088

MMC	PC Connection	590W
6 Mill Street	6 Mill Street	590M
Marlow, NH 03456	Marlow, NH 03456	590Q
SALES 603/446-7721	FAX 603/446-7791	

Microsoft ... 2 years	
Mach 20 (1 yr. w/try)	\$349.
Mouse with Paintbrush (bus or serial)	109.
Mouse with EasyCAD (bus or serial)	125.
MSC Technologies ... lifetime	
OmniMouse (serial only; 1 year warranty)	49.
PC Mouse II w/PC Paint+ (bus or serial)	89.
PC Mouse II w/Atoswitch (bus or serial)	105.
NEC ... 2 years	
Multisync II (800 x 560 max. resolution)	599.
Multisync 2A (VGA Monitor)	call
Orchid Technologies ... 2 years	
Tiny Turbo 286 (accelerator board)	289.
ProDesigner VGA (800x600 VGA Mode)	319.
PC Power & Cooling Systems ... 1 year	
REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 (run 25° - 40° cooler)	129.
Turbo Cool 250 (run 25° - 30° cooler)	169.
Silencer 150 (84% noise reduction)	115.
Silencer 200 (69% noise reduction)	149.
Turbo Cool 375	299.
Practical Peripherals ... 5 years	
1200 Baud Internal Modem (w/PROCOMM)	69.
1200 Baud External Modem (min)	79.
Microbuffer Inline (par. print buffer/32k)	135.
2400 Baud Internal Modem	159.
2400 Baud External Modem	189.
Princeton Graphics ... 1 year	
Ultrasync (supports CGA, EGA, VGA)	549.
Max 15 Monochrome Monitor	269.
Safe Power Systems ... 2 years	
Safe 250W (standby power backup)	249.
Safe 425W (standby power backup)	369.
Safe 500W (standby power backup)	495.
Safe 1200W (standby power backup)	869.
Targus ... lifetime	
Nylon Laptop carrying case	49.
Leather Laptop carrying case	129.
The Complete PC ... 1 year	
The Complete Hand Scanner 400	169.
The Complete Answering Machine	239.
The Complete FAX 4800	279.



Stone & Associates ... NCP

□ **2nd Math (Ages 7 to 16)**—Interactive tutorials that "teach," and six fun activities cover beginning addition through decimals, percents, fractions—even pre-algebra. Requires monochrome graphics or CGA. ... \$27.

For IBM Personal Computers exclusively.

PC CONNECTION®

*DEFECTIVE SOFTWARE REPLACED IMMEDIATELY. DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION.



PC Change.

A kinder and gentler mutation.

Spring is a time of transformation here in the mutable metropolis of Marlow, NH (pop.558). First our snow- and ice-covered back roads turn into treacherous trails of mud, virtually overnight. Next, the local teenagers begin walking around with suspicious looks on their faces. But you really know that spring has sprung when our spritely mascots take off their down-filled parkas, flannel shirts, and countless layers of thermal underwear and begin to romp with reckless abandon in the sunlight. Look out!

Go with the flow.

(Or, why the water's no longer over the dam.)

A lot's changed around here since we first began selling products for the PC in 1982. Back then, our warehouse was in a closet, orders were filled by hand, and the dam on the nearby Ashuelot River was badly in need of repair. But even though we now have a much larger warehouse, the most sophisticated order processing system in micro

mail order, and one of the most solid dams in New Hampshire, we're still country boys, girls, (and animals) at heart.

In spite of all our technological prowess, the parking lot still isn't paved, we're still surrounded by acres of forest, and our idea of a power lunch is using the microwave to heat up soup. Which means that the people you talk to when you call us tend to be a little friendlier, a little more laid back, and a little more patient than your average bear.

Get in your licks!

The most magnificent Marlow miracle of all is still the annual metamorphosis of maple sap into maple syrup—a change that can make everybody's life a whole lot sweeter. A pint of this famous nectar, featuring the mascot who never waffles, is yours free with any order of \$500 or more between now and May 31st.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, please call ahead.



The pot is definitely sweeter with a pint of our pure New Hampshire maple syrup. Offer not available to accounts on net terms. One per customer.

For IBM Personal Computers exclusively.

PC CONNECTION

■ PRESENTATION MANAGER

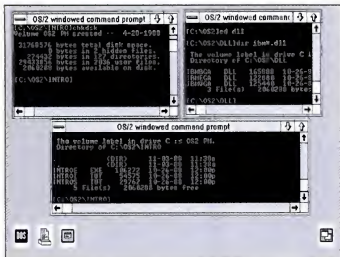


Figure 2: Most OS/2 character-mode programs can be run in "text windows" in the Presentation Manager session. Here, several copies of **CMD.EXE** (the OS/2 command processor similar to **COMMAND.COM** in DOS) are running in separate windows.

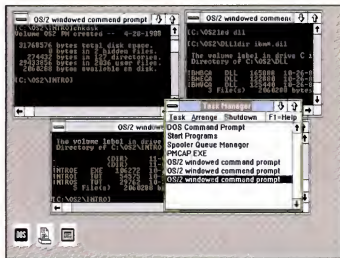


Figure 3: The Task Manager displays a list of all programs currently running under OS/2. You can switch to a program by moving the reverse-video cursor to the name of the program and pressing Enter, or by double-clicking the program name with the mouse.

the "top-down" model that most programmers are accustomed to, and it requires some mental reorientation. The relationship between a Presentation Manager program and the operating system is simply not the same as (and is significantly more complex than) the program/operating system relationship in more conventional environments.

Programmers experienced with *Windows* have a head start. They will find much familiar territory in the Presentation Manager API. The APIs of the two systems are similarly structured, but they differ in nearly all the details, particularly in the graphics language. The big distinction between *Windows* and the Presentation Manager is that *Windows* is an add-on to



Figure 4: The File System program included in OS/2 1.1 displays a directory tree and lets you open directory windows that show the files in the directory. You can perform many file management tasks (such as copying and deleting files) from the File System menu.

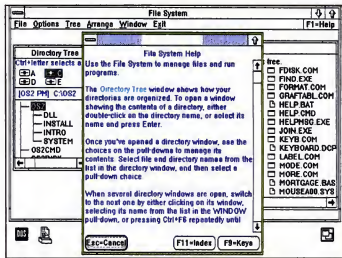


Figure 5: The programs included in OS/2 1.1 display help windows when you press F1. The text uses an easy-to-read proportionally spaced Helvetica font. The buttons at the bottom are used to display an index of the help information and a list of special keys.

DOS (which inhibited some software manufacturers from considering a *Windows* product), while the Presentation Manager is an integral part of OS/2.

Programmers acquainted with other GUIs (such as the Apple Macintosh, *GEM*, or the Unix X Window system) will also find some familiar concepts, but many new ones as well. The Presentation Man-

ager and *Windows* go further than most GUIs in implementing a more object-oriented environment.

When a Presentation Manager program first begins execution, it performs some necessary initialization (in particular, creating a window for the program) and then remains dormant while awaiting messages from the operating system. These messages inform the program of significant events. Some messages signal user input from the keyboard and the mouse. Other messages come from the program's menu or other user interface objects such as scroll bars. The program also receives a message when the user has resized the program's window or when part of the surface of the program's window has to be updated. Working with this message-driven structure is a significant hurdle for the programmer.

I suspect it will take a couple of years for programmers to become suitably famil-

iar with OS/2 and the Presentation Manager to begin exploiting its full potential. (This delay is normal. For example, although the very first version of DOS released in 1981 could support RAM-resident programs, commercial products using this technique did not become prevalent until 1984.)

With experience, the Presentation Manager API reveals itself to be extraordinary, well crafted, and elegant. For most tasks that a program must perform, the API maintains a careful balance between ease, power, and versatility. Overall, it is perhaps the best API ever implemented for a graphical user interface environment. GPI, in particular, is a very powerful graphics programming tool.

There are a few minor flaws in the API, of course, but that's to be expected. In real life, perfection is rarely achieved. The API also lacks a few helpful high-level items, such as multiline edit controls (supported

under *Windows*) and a standardized File Open dialog box (which the Macintosh has).

THE BASE OPERATING SYSTEM

Because the Presentation Manager is part of OS/2, programs written for the Presentation Manager benefit from the strength of the base operating system.

OS/2 uses the protected-mode operation of the 80286 and 80386 microprocessors to make available a 16MB physical address space. The implementation of virtual memory also allows each application to use much more memory than is physically available.

OS/2 is a multitasking operating system, obviously an important feature for a graphical user interface that can run several programs at once. Unlike that of *Microsoft Windows*, OS/2's multitasking is preemptive and priority-based. OS/2 also has other operating-system support necessary

With 3M's
new formatted
diskettes you never
have to stop

■ PRESENTATION MANAGER

for multitasking, such as file sharing and protection, and semaphores that help coordinate access of resources by multiple applications.

OS/2 programs can themselves take advantage of OS/2's multitasking by creating multiple threads of execution, each of which can run concurrently. It turns out that multiple threads are particularly useful in a graphical user interface. The messaging architecture of the Presentation Manager sometimes inhibits normal preemptive multitasking because all messages related to user input must be serialized (processed one after another, or nonconcurrently). Programs can get around this limitation by creating additional threads of execution that carry out work independently of the messaging architecture. This results in a much smoother and more efficient overall operation of the system.

INTERPROCESS COMMUNICATION

One particular strength of OS/2 1.0 was the support of various types of interprocess communication (IPC). These include shared memory, system semaphores, Unix-style pipes, and queues.

OS/2 1.1 adds three more forms of IPC to this collection. First, "named pipes" are now a part of the base operating system rather than only part of Microsoft's *LAN Manager*. While named pipes are the most important form of IPC over a local area network, they may also be used by programs running on the same machine.

The second form of new interprocess communication is the Presentation Manager clipboard. This is a form of shared memory that assists in cut-and-paste operations between programs. Under user control, a program can copy data in a specific format to the clipboard, and other programs (or the same program) can retrieve this data and paste it into its document file.

Dynamic Data Exchange (DDE) is a form of interprocess communication originally developed for Microsoft *Windows* that is also supported under the Presentation Manager. DDE is based on the messaging architecture of the Presentation Manager. It allows programs to send out requests for information from other programs (perhaps even programs that the requester is not familiar with) and receive this information through messages.

THE CONSISTENT USER INTERFACE

The Presentation Manager establishes (but does not impose) a consistent user interface for programs. All the logic that implements menus, dialog boxes, buttons, scroll bars, and so forth is built into the Presentation Manager. All menus in Presentation Manager programs function the same way because they use this common code.

If *Windows* is any indication, programmers who write applications for the Presentation Manager will go further by styling their programs' menus on those of existing programs. For example, many programs (such as word processors, spreadsheets, and so forth) work with files. The recommended practice in *Windows* and the Presentation Manager is to name the first item on the program's menu "File." This option invokes a pull-down menu with an Open option that displays a dialog box to open a new file. The keystrokes Alt-F-O will always invoke a dialog box to open a file regardless of the program.

Although some people fear that this consistent user interface will cause application programs to become overly similar and bland, this has not been the case in Macintosh or *Windows* software. What actually happens is quite different: the Presentation Manager takes care of the more

mundane aspects of the user interface, leaving the programmer free to spend more time where it really counts.

DEVICE-INDEPENDENT GRAPHICS


DOS is so weak on even text output that many programmers ignore the operating system and the ROM BIOS and write output directly to the screen. For graphics, writing directly to the screen is nearly a necessity. Over the years this has caused problems, since programs must struggle to keep up to date with emerging graphics standards.

The situation with printers is even worse. Most DOS word processing programs these days come with one or two diskettes filled with nothing but small files, each one for a particular printer.


Presentation Manager's device-independent graphics system, GPI, makes this collection of files no longer necessary. Presentation Manager programs use GPI for all text and graphics output. Device drivers take care of translating the graphics to a particular output device.

GPI is largely derived from IBM's Graphics Data Display Manager (GDDM) mainframe graphics system, with some extensions inherited from *Windows*. Quite simply, GPI is the most sophisticated and powerful graphics system available for small computers (with the possible exception of *Display PostScript*). GPI goes far beyond the graphics systems in other popular windowing environments, such as the *Windows* Graphics Device Interface (GDI), Macintosh *QuickDraw*, and the Unix X Window system, and even beyond more dedicated graphics programming languages such as the two-dimensional implementation of the Graphical Kernel System (GKS).

Here are a few features for graphics aficionados: GPI supports both image-based and vector-based fonts; a variety of curved lines (ellipses, Bezier splines, and quadratic interpolations); a hierarchy of coordinate spaces with matrix transforms between them; rectangular and arbitrary nonrectangular clipping; PostScript-style paths (used for filling, clipping, or thick stroking with ends and joins); alternate and winding area fill modes; all 256 possible raster operations for displaying a bitmap combined with a pattern on a surface; color



FACT FILE



OS/2 Standard Edition 1.1
IBM Corp.
Contact your local authorized IBM dealer.
List Price: \$340 (free upgrade from OS/2, Version 1.0)

Requires: 2MB RAM (2.5MB when a DOS compatibility session is used), 8MB available hard disk space, IBM 80286- or 80386-based personal computer, IBM graphics adapter and display.

In Short: OS/2 1.1 includes the Presentation Manager, a graphical user interface with a powerful and well-designed API. However, the OS/2 1.1 package is marred by some design flaws, rough edges, and unfinished business in the included programs. Not copy protected.

CIRCLE 423 ON READER SERVICE CARD

table (palette) support; retention of graphics drawing orders in segments; and metafiles that retain the current graphics state as well as drawing and attribute commands.

That such a rich graphics system is included in OS/2—and available to every program that uses the Presentation Manager API—is still, to my mind, astonishing.

LAURELS AND ADMONITIONS People who enthuse about the direction that IBM and Microsoft have taken with OS/2 (and I am obviously one of these people) see the Presentation Manager as a important evolutionary step for the industry that has grown up around the IBM PC. As a successor to DOS and a competitor of everything from the Apple Macintosh to Sun workstations, OS/2 and the Presentation Manager must help bring the PC into the modern age.

Most important, IBM and Microsoft have done a really fine job with the Presen-

tation Manager API. This is obviously the critical part of the system, and it's in good shape. In contrast, the various programs included in the retail release of OS/2 1.1 obviously need some more work. These are the programs that are important for using Presentation Manager. They must be easy to use and intuitive, and they must be models of good Presentation Manager programming style. They are not.

Another troublesome aspect of the Presentation Manager involves the development and distribution of device drivers for video display adapters and printers. At this time it seems as if IBM is interested in supporting only video boards and printers that have IBM labels on them. The people at Microsoft have taken a much greater interest in getting printer drivers written, but it is not clear at this time how these drivers will be distributed. I think that IBM and other hardware manufacturers that sell OS/2 should be involved at least in the dis-

tribution (if not the development) of these device drivers.

OS/2 and the Presentation Manager have taken a lot of flak regarding the hardware (particularly memory) required to run the system with reasonable performance. This is partially the result of OS/2's being released at a time when memory prices are very high. But certainly no one at IBM or Microsoft can claim that the OS/2 and Presentation Manager code is as memory efficient as possible. This is another area where more work should be done, even if it's likely that memory prices will be more reasonable by the time most users are ready for OS/2.

It strikes me that it would truly be a shame if the success of a system as fine as this one were compromised by something as trivial as memory chips.

Charles Petzold is a contributing editor of PC Magazine.

in the middle of what you're doing to format a diskette.

No one likes to be interrupted. Especially by a diskette.

So, we're introducing 5¼ inch formatted diskettes for IBM® PCs and compatibles. They eliminate all formatting hassles, so you won't have to be interrupted anymore.

They're compatible with DOS versions 2.0 and higher. And our Mark Q™ process assures you of our usual product standards. Exceptional durability,

consistency, reliability and performance.

So next time you're saving data and don't want to waste any time, make sure you have 3M formatted diskettes.

We guarantee you'll never have to stop in the middle of what you're doing again.

If you'd like more information, call us toll-free at 1-800-888-1889, Extension 40.

3M

Samtron Color Monitors Make Sense In Black & White.



Whether you want one color, no colors or 256 colors, Samtron monitors probably have all the specs you're looking for. Without all the usual expense. That's because we don't offer you every model under the sun. Only the most popular ones.

Like our new CGA, EGA and VGA series.

Which means they can be mass produced in Korea very economically. By Samsung, the world's largest monitor manufacturer.

Which also means their reliability is world class. And they're designed in the U.S. for a completely American look and feel.

So before you spend too much green on high-priced monitors, check out Samtron's colors.

You'll like the way their numbers look in black and white.

SAMTRON

SAMSUNG ELECTRON DEVICES

USA HEADQUARTERS
SAMSUNG ELECTRON DEVICES
AMERICA, INC.
TEL: (213) 802-8428
FAX: (213) 802-8820
PARTS & OEM SERVICE
TEL: (714) 522-1282

CUSTOMER SERVICE
EAST
TEL: (800) 227-3378
MID-WEST
TEL: (800) 277-3378
WEST
TEL: (800) 543-5782

HOME OFFICE
SAMSUNG ELECTRON DEVICES
SEOUL, KOREA
TEL: (02) 772-8888
TELEX: STARNED K33217
FAX: (02) 772-8879

USA DISTRIBUTORS
SAMSUNG AMERICA INC.
TEL: (201) 582-7500
INCOM GROUP INC.
TEL: (800) 255-8183
SAMSUNG PACIFIC INT'L INC.
TEL: (408) 670-8844

CANADIAN DISTRIBUTORS
CANADA TECHNOLOGIES INC.
TEL: (416) 860-2525
STERLING MICRO SYSTEM INC.
TEL: (804) 270-3233

ADD-IN BOARDS FOR THE HP LASERJET

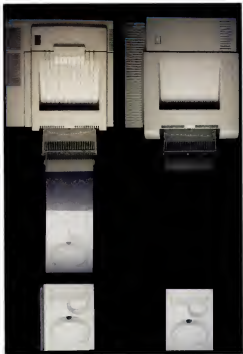
Post-Purchase PostScript

Adding PostScript to your LaserJet is more than just an inexpensive way to get fancy typesetting. The speed improvement over an Apple LaserWriter can be startling.

You say you bought a Hewlett-Packard LaserJet Series II for desktop publishing, and now all the graphic artists around the shop have been kicking PostScript sand in your face? Do you long for the infinite control of PostScript outline fonts but can't stretch your budget to accommodate a new PostScript printer? If this is what's troubling you, put your mind at ease, because help is here.

In its original state, Hewlett-Packard's old reliable is quite capable of handling the great majority of the desktop publishing tasks that will ever be thrown at it in a typical business setting. Still, PCL, the LaserJet's native printer control language, has its limitations, and there are certainly times and places that call for PostScript.

You need a PostScript printer if you send your final copy to a high-quality Linotronic typesetter and you want to create good-quality page proofs from the same code, for example. Or, if you are doing full-page presentation graphics, you need PostScript if you want to print at more than the 150-dot-per-



■ POSTSCRIPT ADD-IN BOARDS

inch resolution that is practical on the LaserJet. And many desktop publishing programs have better drivers for PostScript than for the unenhanced LaserJet.

Whatever the reason, you don't have to chuck your LaserJet and start over with a new printer. Today, a number of solutions, both hardware- and software-based, bring the power and flexibility of PostScript to your LaserJet. By taking advantage of the Series II's expansion slot and enhanced features, you can pump it up into a typographic powerhouse that's even faster than a standalone PostScript printer. And all it takes is an open slot in your computer, a few free megabytes of disk space, and 3 minutes with a screwdriver. Plus, of course, a fair amount of cash—about \$2,300, give or take \$500, which will buy any of the six systems tested here.

A CUSTOM CONNECTION Physically, all six of these products look remarkably similar, being made up of the same basic components: a board that you install in an unused expansion slot in your computer; another, much smaller board that fits into the expansion slot on your LaserJet Series II; and a custom cable that connects these two cards. Special software drivers help them all work together.

The board that goes in your computer is the brains of the whole operation. It is essentially a single-board PostScript controller, built around an independent microprocessor supported by 2MB or 3MB of RAM (in some cases expandable to 6MB). Most of the cards use a Motorola 68000 microprocessor. The exceptions are the Conographic system, which uses a proprietary CPU, and the Princeton Publishing Labs system, which uses an advanced RISC processor that gives it a considerable boost in speed.

The system memory stores the PostScript software and interprets the PostScript commands that define the format of the page. It also stores the font outlines and is used both as a workspace for holding the individual characters as they are formed from the font outlines and for holding the image of the page as it is formatted.

As a page is created, it is sent out to the printer through a high-speed video port that is connected directly to the printer's laser imaging system, through a second

board installed in the printer's expansion slot (located behind a small oblong plate to the left of the regular port connectors). Consequently, these systems are capable of much better resolution than a stock LaserJet because they are not limited by the printer's memory.

OPERATIONAL DIFFERENCES Of the six products reviewed here, only the QMS JetScript uses the genuine PostScript language licensed from Adobe Systems, the developer of the page description language. The other manufacturers chose instead to use one of the recently released PostScript clone products. In our testing, we did find some evidence of incompatible behavior on the part of some of the clones, but overall they seemed to do as well as the true-blue Adobe product.

The products can differ significantly in their operation, however, depending on how the PostScript code is treated. Most of the systems tested here can be configured to take over one of your DOS printer ports (LPT1 through LPT3), allowing them to

■ These boards produce blazing times for graphics and give up but little to an unadulterated LaserJet in text speed tests.

be used directly from any application that can send a stream of PostScript code to a printer. Another, less convenient, approach is to print your PostScript code to a disk file and then process it with a separate PostScript interpreter program to get a printed page. Since the PC Labs benchmark tests were run using PostScript files that had been printed to disk, you should be aware that these products might perform differently when printing directly.

In any case, these boards are fast, producing blazing times for graphics, while giving up little to an unadulterated LaserJet

Series II in text speed tests. On PostScript graphics, the differences are especially dramatic: a job that required between 25 and 30 seconds for the fastest add-in boards to handle ate up over 18 minutes on the 68000-based Apple LaserWriter NT, and a full 7 minutes on the 68020-based LaserWriter NTX.

A REAL BARGAIN But what do you give up by adding PostScript to your LaserJet Series II, besides a couple of thousand dollars? The answer is, not much. In most cases, you can still use your printer as a LaserJet. Because the add-in boards have a custom connection between the computer and the printer, your standard parallel or serial port connection to your LaserJet is still in place. However, if you choose to go this route, be aware that you may face more work at installation time to avoid port conflicts.

If you have an XT compatible, your choices are somewhat limited, because some cards require a 286- or 386-based machine. All of the cards fit just fine in 8-bit slots, however; the two cards with 16-bit edge connectors can be configured to work in 8-bit slots without a problem. Even if your computer is an IBM PS/2 with Micro Channel expansion slots, you are not left out of the picture; a number of these manufacturers have Micro Channel versions of their products or are planning to release them in the future.

Also, be careful if you're counting on sharing your newly PostScript-compatible printer. Some of the boards do not work in network servers, and those that do are sometimes limited in the types of networks they support. Moreover, the nonstandard cables these products use make it certain that you will not be able to hook them to a printer switch box.

Aside from these small points, these boards turn out to be remarkably attractive buys. Not only do they run significantly faster than most PostScript printers available on the market today, but you also won't have to pay for the privilege of keeping your LaserJet. With discounted prices for the Series II running at \$1,700 to \$1,800, these boards let you acquire a PostScript-compatible laser printer for about \$4,000. And best of all, you still have your LaserJet.

■ POSTSCRIPT ADD-IN BOARDS

CONOGRAPHIC CORP. ConoDesk 6000

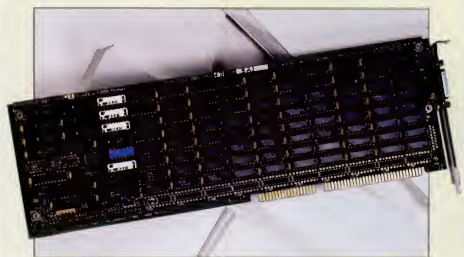
Conographic Corp. produces a number of high-performance graphics products, including high-resolution displays for desktop publishing applications. Its entry in the PostScript add-in race is the \$2,695 ConoDesk 6000, a board that represents a decent value despite its high price.

The ConoDesk 6000 is based on a sandwiched expansion board built around a proprietary 32-bit microprocessor with 2.5MB of on-board memory. The board comes with a 16-bit edge connector but can be configured so that it will work in an 8-bit slot. The manufacturer recommends that you use it with a 286- or 386-based computer. The processor board connects to an HP LaserJet expansion card through a special cable. The cable has a standard 25-pin connector on the printer end and a 26-pin connector the size of a 15-pin connector on the computer end. This unusual-looking combination eliminates the possibility of confusion about which way to install the cable. Different versions of the printer adapter are available for the older LaserJet and LaserJet Plus models, as well as for the Canon LBP-II, Brother HL-8, and the Ricoh PC 6000/EX.

Installing the ConoDesk 6000 is straightforward. Before you put the processor card in your computer, you run a program that polls different parts of your computer system, searching for possible conflicts. When it has finished its search, the program shows you how to change switch settings and software parameters on-screen, eliminating frustrating trial and error in the installation process. Before you can use the ConoDesk 6000 after power-up or reset, you run a short program that initializes the card.

A pair of 1.2MB floppy disks containing the PostScript programs, font outlines, and utilities accompanies the board.

TWO-STEP PRINTING Printing a document using ConoScript, the unit's PostScript-compatible interpreter, requires two steps: First you must print out the PostScript commands to a disk file; second, you enter a command and the filename at the DOS prompt to translate and print the document. (ConoScript also allows you to



The ConoDesk 6000 (\$2,695) uses a PostScript interpreter program to print documents from disk files of PostScript code.

issue PostScript commands interactively, for quick drawing on the fly.) According to its maker, ConoScript has been certified by an independent testing laboratory for compatibility with Adobe's PostScript, Version 47.0.

This approach can be convenient enough if you already have the PostScript output files on-disk. But if your application program routes its PostScript output only to a standard parallel or serial port, the ConoDesk 6000 will not be able to process

it. And using ConoScript requires your computer to have an 80287 or 80387 math coprocessor chip.

You can, however, print directly from *Ventura Publisher* and from *Windows* applications such as *PageMaker* by using the special high-speed custom drivers that come with the board. (You do not need the coprocessor to use the product with these custom drivers.)

In the graphics portion of the PC Labs benchmark tests, the ConoDesk 6000 was one of the faster performers. In the text portion of the tests, it was among the slower products.

Overall, the ConoDesk 6000 is a solid and easy-to-install performer, offering a full complement of PostScript fonts. On the other hand, it has the second highest list price in the pack, and it requires an inconvenient two-step process to print a PostScript document. If you can live with this, it still represents a good value in terms of features and performance.

DESTINY TECHNOLOGY CORP.

PageStyle

The PageStyle has the lowest price of the bunch, costing (at \$1,790) about the same as the LaserJet Series II printer itself. The question is, what do you give up when you save money over the competing products?



FACT FILE

ConoDesk 6000

Conographic Corp.
16802 Aston St.
Irvine, CA 92714
(714) 474-1188

List Price: \$2,695

Requires: 640K RAM, 80287 or 80387 math coprocessor (for ConoScript). Cannot be installed in network servers.

In Short: The ConoDesk 6000 is one of the fastest for printing graphics, but it is limiting in that you cannot print PostScript jobs directly from the application. If you can get your output into a disk file and you don't mind this two-step process, however, the package can be a good value.

CIRCLE 417 ON READER SERVICE CARD

With Type Director And Your LaserJet, You've Got A Whole New Avenue To Explore In Producing Documents.

Great typefaces. All the top art directors on Madison Avenue use them to help their ads grab people's attention.



And now, thanks to Type Director, you can use them to help get the same kind of attention for your documents.

Co-developed By Hewlett-Packard. Type Director is the fastest, easiest-to-use font generation program you can own for your PC. A joint development of Hewlett-Packard and AGFA Compugraphic Division, it adds remarkable power to your LaserJet printer to produce documents that look like they were prepared by communications specialists. It's ideal for all word processing and desktop publishing applications from the simplest memos to multi-page newsletters.

Compugraphic. One Of The Biggest Names In Type. When you think about it, it shouldn't come as a surprise. After all, AGFA Compugraphic is a supplier of typefaces to top advertising agencies, printers and publishers everywhere. Its typeface library is the biggest and best in the world, with over 1700 typefaces.

The Big And The Small Of It. A high-performance scaling technology found only in Type Director lets you make each typeface bigger or smaller until it's the exact size you want, from a tiny 4 points to a huge 200 points. But no matter what size you finally do decide on, each character will be crisp, clear and handsome.

We've Seen To It That There Are No Surprises.

When you're using Type Director, you see the characters on your screen exactly as they'll appear in your output. There are no surprises when you print out the results. And you get the fonts you need in just a few moments—decidedly more quickly than with any other software available today.

You'll Wonder How You Managed Without It. What is Type Director's impact on the fonts you're using now? Not to worry: Type Director will easily manage any "soft fonts" you may have as long as they're Hewlett-Packard LaserJet compatible.

(Most are.) By converting to Type Director, you protect your investment while making your desktop publishing system much more flexible and useful.

Type Director Does It All. Think about it. Type Director lets you generate characters, monitor and manage your library of typefaces, automatically install them in your application, and immediately send them to your printer—all by touching just a few keys.

Learn By Doing. Not By Reading. Type Director is incredibly

Type Director Compatibility Information.

Type Director is fully compatible* with the following:
COMPUTERS: IBM XT, AT, Personal System/2 and compatibles with hard disk, 640K bytes RAM, running MS-DOS or OS/2. PRINTERS: Hewlett-Packard LaserJet PLUS, LaserJet 500 PLUS, LaserJet 2000; LaserJet Series II, LaserJet III and compatibles. APPLICATIONS/ENVIRONMENTS: Aldus PageMaker I.A and 3.0; Xerox Ventura Publisher 2.0; Microsoft Word 4.0 and 5.0; Microsoft Windows 2.03 and 2.1; WordPerfect 5.0; Other software programs supporting LaserJet "soft fonts". DISPLAYS: VGA, CGA, EGA; Hercules Monochrome AT&T 6300; Xerox PC Full Page Display; WYSE 700 Graphics; Compaq Monochrome; Hi Res Monitor (96x96); Hi Res Monitor (100x100).

*For compatibility information on unlisted printers, displays and applications, phone 1-800-873-FONT.



simple to use. It's entirely menu-driven, so there's no thick manual to have to hunt through. All you do is respond to the prompts on the screen. A built-in HELP function handles any questions that may arise.

Go Creative With Your Documents Now. You don't have to wait any longer. Your documents can

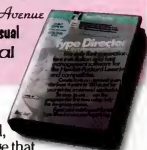
Save \$455 On Our Type Director Debut Edition.

Priced separately you'd pay \$680 for Type Director and our Debut Edition of typefaces, but order now and they're yours for only \$225.

Here's what you receive at one great price:

- Type Director Font Management Program
- Vol. 1 Four typefaces from the CG Times family
- Vol. 2 Four typefaces from the Univers family
- Vol. 3 From the Decorative collection:

Park Avenue
Dom Casual
Uncial
Brush



have that distinctive, professional, creative edge that gets attention now. All it takes is Type Director. And all it takes to get Type Director is visiting your local Hewlett-Packard dealer, returning the order form adjacent to this ad, or calling our convenient Type Director hotline right now at 1-800-873-FONT.

AGFA 

AGFA COMPUGRAPHIC DIVISION

Type Director is a trademark of Compugraphic Corporation. Ventura Publisher is a registered trademark of Ventura Software, Inc.

Microsoft Windows, MS-DOS, and Microsoft Word are registered trademarks of Microsoft Corp. CGA, EGA, and VGA are trademarks of International Business Machines Corporation.

Hercules is a trademark of Hercules Computer Technology. Wyse is a registered trademark of Wyse Technology Inc. Hewlett-Packard LaserJet is a registered trademark of Hewlett-Packard Corporation. PageMaker is a registered trademark of Aldus Corporation. WordPerfect is a registered trademark of WordPerfect Corporation. Other brand or product names are trademarks or registered trademarks of their respective holders. © 1989 by AGFA Compugraphic Division.

CIRCLE 200 ON READER SERVICE CARD

■ POSTSCRIPT ADD-IN BOARDS



As it comes from the box, the \$1,790 PageStyler from Destiny Technology Corp. has enough memory for only 13 font outlines.

One thing you don't give up is ease of installation and use. The PageStyler installation program copies the three diskettes of files to your hard disk and either steers you through the default settings or examines your hardware to help you make custom settings easy to determine. The manual is well written, and its pages are attractively designed with ample white space, plenty of screen shots, and clear illustrations. It should give even the most timid novice the confidence required to tackle such daunt-

ing topics as DIP switch settings and IRQ interrupt choices.

You can use the PageStyler with any program that can send PostScript output to a printer port. The manual gives instructions on how to select the PostScript printer driver to use with the most popular application programs. It can be installed in TOPS and 3Com network file servers.

While the PageStyler does not come with standard Adobe fonts such as Times Roman or Helvetica, it does support their Bitstream equivalents: Dutch and Swiss. And it can even append the Adobe names to these fonts to make sure that your applications can recognize them.

WHERE'S THE CATCH? So what do you give up?

First of all, you must compromise on the number of usable fonts. The PageStyler comes with only a bare minimum of 13 font outlines. If you want the other 22 outlines found in most PostScript printers, you must add a 2MB memory upgrade.

Worse, you give up time. On an 8-MHz IBM PC AT, the PageStyler takes about 2 minutes to initialize and load its fonts, and you do not see a DOS prompt until it is finished. Even then, you must wait an additional minute or so before the initial test page comes out of the printer. When it comes to actual print jobs, the PageStyler

Use Type Director To Make Documents More Professional. Send In This Form Today.

- ☐ I need Type Director™ to produce professional-looking documents. Rush me the items indicated.
☐ Please send more information.

QTY	ITEM	PRICE*
	Type Director Debut Edition, MS/DOCS (Includes 12 typefaces: Volumes 1, 2, 3)	\$225
	Type Director Debut Edition, OS/2 (Includes 12 typefaces: Volumes 1, 2, 3)	\$225
	Type Director Font Management Program (Includes 2 typefaces: CG Times, Univers Bold)	\$95
	Vol. 1: CGTimes†	\$195
	Vol. 2: Univers†	\$195
	Vol. 3: Decorative† (See ad)	\$195
	Vol. 4: CG Triumvirate†	\$195
	Vol. 5: Univers Condensed†	\$195
	Vol. 6: Futura II†	\$195
	Vol. 7: Microstyle†	\$195
	Vol. 8: Decorative† (ITC Zapf Dingbats 100, 200, 300)	\$195
	Vol. 9: CG Century Schoolbook†	\$195
	Vol. 10: ITC Bengaliat†	\$195
	Vol. 11: ITC Lubalin Graph†	\$195
	Vol. 12: ITC Avant Garde Gothic†	\$195
	Vol. 13: ITC Souvenir†	\$195
	Vol. 14: Garamond Antiqua†	\$195

Subtotal	
Applicable state and local sales tax	
Shipping/handling (\$5 per item)	
Total order	

Name _____

Company _____

Address _____
(No P.O. boxes please)

City _____

State _____ Zip _____ Country _____

Phone (____) _____ Ext. _____

Every effort will be made to ship your order within 24 hours. All shipments are via Federal Express; please indicate street address since Federal Express can not deliver to a post office box.

☐ Check or money order enclosed payable to: AGFA Compugraphic. ☐ MasterCard ☐ Visa

Account No. _____

Exp. _____ Today's Date _____

Signature _____

Order Hotline 1-800-873-FONT

AGFA

AGFA COMPUGRAPHIC DIVISION

90 Industrial Way, MS 904-3C
 Wilmington, MA 01887-9945
 (508) 658-5600 Ext. 2484/2485

*Prices stated in U.S. dollars and subject to change without notice.
 †All products come with MS-DOS & OS/2 compatible diskettes unless otherwise noted. Each volume contains 4 typefaces from the family listed unless otherwise noted.

CIRCLE 200 ON READER SERVICE CARD

PC
 MAGAZINE

FACT FILE

PageStyler

Destiny Technology Corp.
 300 Montague Expressway
 Milpitas, CA 95035
 (800) 874-5553
 (408) 262-9400

List Price: \$1,790

Requires: No RAM required (comes with 2.5MB RAM of its own); HP LaserJet Series II printer. Can be installed in TOPS or 3Com network servers.

In Short: The PageStyler has a low price, but it suffers from a lack of font outlines and slower performance than that of its competitors. More appealing alternatives are available.

CIRCLE 418 ON READER SERVICE CARD

JUGGLE YOUR TSRS WITHOUT LOSING CONTROL.

EXTRA™ The innovative memory manager that gives you single keystroke access and control over all your TSRs.

Using RAM resident programs (TSRs) is a tough juggling act. One slip, one wrong keystroke, and they all come crashing down. Now you can get a grip on up to 26 TSRs while your computer uses only the memory of the largest program (plus 35K for EXTRA). Free your valuable RAM for applications, save your programs to hard disk using extended or expanded memory and tame those memory-hungry TSRs with EXTRA. There's even a toll free "EXTRA Support" hotline.

SAVE \$\$\$ ON POPULAR TSRS!

Buy EXTRA now and receive valuable rebate coupons for 5 popular TSRs: Norton Guides, PC Tools, Deluxe, Graph-in-the-Box, InvestNow! and Pop Up DeskSet.



For the name of the dealer nearest you, call:
(800) 242-6368

1621 Westgate Road, Eau Claire, WI 54703
(715) 832-7575 FAX (715) 832-0700

© 1988 Delta Technology International, Inc. EXTRA is a trademark of Tally-Win Corporation.



CIRCLE 256 ON READER SERVICE CARD



Sure it's Insured?

Most computers are not insured. And ordinary policies may exclude or limit the coverage you need. Do you have the ready cash to replace stolen or damaged equipment? You will if you have SAFEWARE's comprehensive Computerowners coverage. It provides full replacement of hardware, media and purchased software for just pennies a day! Your protection includes theft, fire, accidental damage, natural disasters like earthquakes, and more. Even costly power surges are covered. Just select your system value and premium from the table below. Use the coupon or call for immediate coverage or more information.

Amount of Insurance	Annual Premium
Up to \$2,000	\$ 39
\$ 2,001-\$ 5,000	\$ 69
\$ 5,001-\$ 8,000	\$ 89
\$ 8,001-\$11,000	\$109
\$11,001-\$14,000	\$129

Call for rates on higher amounts

Call Toll Free
1-800-848-3469

Local 1-616-262-0559

On CampusServe, GO SAF

SAFEWARE

SAFEWARE, The Insurance Agency Inc.
2929 N. High St. P.O. Box 62211
Columbus, OH 43262

10 DAY TRIAL. Review your policy for 10 days after you receive it. Satisfaction guaranteed or your money back.

Name

Address

Phone (Daytime)

☐ Check Enclosed ☐ Visa ☐ MasterCard Exp

Card #

Total value of hardware, media and purchased software \$

(Subject to full review)

Your signature

Mail to: **SAFEWARE, The Insurance Agency Inc.** P.O. Box 62211 Columbus, OH 43262

CIRCLE 728 ON READER SERVICE CARD

■ ADD-IN BOARDS

was one of the slowest on the graphics test and was merely in the middle of the pack on the text speed test.

The PageStyler looks like a great deal with its low price. But in the end, when you start comparing performance and features with other competing products, you'll find that faster printing and a full set of fonts don't cost much more.

EICON TECHNOLOGY CORP.

EiconScript Card

The \$2,075 EiconScript Card from Eicon Technology is an interesting but flawed product.

It has many good points. It is relatively easy to install, and because it can be addressed as one of the parallel ports, it can be used with almost any program. It can be installed in the file server for any MS-DOS-based network. Its PostScript clone interpreter has a full complement of 35 font outlines. It comes with 2MB of memory, and you can add up to 2 more megabytes by installing a daughtercard, at a cost of \$600 per megabyte.

Like the other add-in boards in this review, the EiconScript uses a video interface to send the page image to the printer.



FACT FILE

EiconScript Card

Eicon Technology Corp.
2196 32nd Ave. (Lachine)
Montreal, Quebec
Canada H8T 3H7
(514) 631-2592

List Price: PC version, \$2,075 USD; PS/2 version, \$2,275 USD

Requires: Card carries 2MB RAM on board but needs 4MB RAM in host system and 1.5MB free hard disk space; 8- or 16-bit slot. XT, AT, PS/2, or compatible; can be installed in servers for MS-DOS-based networks only.

In Short: A full complement of fonts and the ability to send output directly to a port or to an intermediate disk file makes the EiconScript look good at first. But poor documentation, questionable quality control, and relatively low performance make this board less appealing than its competitors. Wait for the new 16-MHz version, due out soon at the same price, before considering this package.

CIRCLE 418 ON READER SERVICE CARD



FloppyDRIVER



■ POSTSCRIPT ADD-IN BOARDS

It also uses a standard parallel or serial connection for PostScript operations. But this connection can be used to send PCL commands to the printer, so you don't lose your LaserJet's native capabilities.

ERRORS OF OMISSION But the EiconScript suffers from problems of execution, such as inadequate documentation. One step in the installation requires you to specify what kind of printer you're using. The sneaky part is that the manual does not tell you that you have to choose the LaserJet Series II option, not the Canon SX En-

gine option (which the Series II is, but that's the wrong answer for the EiconScript). According to an Eicon representative, the manual is being revised and a new version should be shipping soon.

More serious were the quality problems we discovered while trying to get the package to work. In the end, a hand-delivered system worked flawlessly, but only after we spent hours fussing over two complete packages that came through the mails.

Once it was running properly, the board proved a lackluster performer at best. According to the manufacturer, the system

uses a "double buffering" technique to increase its performance, holding one page in a portion of memory for conversion into a video signal at the same time that it uses another portion of memory to compose the next page. Yet though it was tested with 3MB of RAM, its graphics times still put it near the end of the pack. And in the text speed test it came in dead last, a full page per minute slower than the fastest system.

By the time this is in print, claims an Eicon representative, the company should be shipping a newer and faster version of the EiconScript card, one with a 16-MHz



PostScript Add-In Boards: Summary of Features

(Products listed in ascending price order)

All of the PostScript add-in boards we reviewed have certain features in common. Each of them utilizes a video interface connection (the number of pins on each connector is indicated in the table). And every board allows you to use your LaserJet printer as such while the PostScript board is installed.

Among the type styles included with every board are Helvetica, Times, and Courier, each offered in roman, bold, italic, and bold italic fonts. In addition, all of the boards support type styles available from third-party vendors.

	PageStyler Destiny Technology Corp. \$1,790	PC Publisher Kit Series II QMS Inc. \$1,995	EiconScript Card Eicon Technology Corp. \$2,075	JetScript QMS Inc. \$2,495	ConoDesk 6000 Conographic Corp. \$2,695	PS-366 Accelerator Princeton Publishing Labs Inc. \$2,795
Card size	8-bit	18-bit	8-bit	18-bit	16-bit	16-bit
Slot size required	8-bit	8-bit	8- or 16-bit	8-bit	16-bit	8-bit
Processor type	Motorola 68000	Motorola 68000	Motorola 68000	Motorola 68000	Proprietary	RISC
Processor speed	12 MHz	12.5 MHz	12 MHz	16.67 MHz	13.3 MHz	10 mips
Base memory	2.5MB	2MB	2MB	3MB	2.5MB	3MB
Minimum memory upgrade	2MB	N/A	1MB	N/A	N/A	N/A
Maximum memory upgrade	4.5MB	N/A	4MB	N/A	N/A	N/A
Computer connector	37-pin	37-pin	37-pin	37-pin	15-pin	25-pin
Printer connector	37-pin	37-pin	37-pin	37-pin	25-pin	25-pin
Number of type styles included	13 (22 additional type styles, \$150)	35	35	35	35	35
Printer control languages supported						
Adobe PostScript	○	○	○	●	○	○
Clone PostScript	●	●	●	○	●	●
DDL	○	●	○	○	○	○
HP PCL	○	○	●	○	○	●
Other	None	None	None	None	None	Epson LQ

PC—Editor's Choice ●—Yes ○—No N/A—Not applicable; memory cannot be upgraded.

...with the incredible HeadStart III.™



At VenDEX we design every computer as a complete system. We integrate peripherals usually offered only as options and include an unprecedented package of 14 name brand programs worth thousands of dollars FREE!...All you have to do is add the electricity and you're immediately productive.

Incredibly convenient. The

The HeadStart III has two internal drives: a 1.2 megabyte, 5.25-inch and a 1.44 megabyte 3.5-inch, both standard.

So you don't have to choose between the two, you use either, depending on your software.

Incredible performance. At the heart of the HeadStart III is a 12MHz 80286 processor with one megabyte of standard RAM, with the hard drive system delivering 32 megabytes of storage operating at 28 milliseconds with astonishing 1 to 1 interleave. Plus, true 16 bit VGA Graphics is component matched for high speed and clarity.

Plus, incredible expandability and support. The HeadStart III is designed for your future as well as your present applications, with four expansion slots for networking and for the diverse peripherals already becoming available. With the HeadStart III, you're OS/2 ready right now. You can add two full megabytes of RAM, without

having to buy any additional boards.

In addition, our PC Coach hotline is available to registered owners with questions about hardware, software or service.

To obtain more information about the HeadStart III and our full line of advanced computer systems, or to find the name of the nearest dealer call toll free **1-800-882-1888.**

You'll see, it really is incredible.

SPECIFICATIONS

MICROPROCESSOR: Intel 80286-12
SPEED: 12MHz 8 Switchable
BIOS: Award
BUILT IN RAM: 1 Megabyte
EXPANDABLE TO: 3 megabytes
POWER SUPPLY: 145 watts (2) 220 switchable
KEYBOARD: 101 key PS/2 compatible
GRAPHICS: VGA Adapter
FLOPPY DRIVES: one 5.25" 1.2 megabyte,
one 3.5" 1.44 megabyte

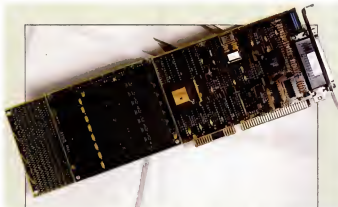
HARD DRIVE: 32.1 megabyte, 28 milliseconds,
3.5 inch drive
BUILT IN INTERFACES: Parallel, 2, RS232 serial,
mouse, joystick
EXPANSION SLOTS: 3 available
MOUSE: Standard
SOFTWARE: DOS 3.3, CW Basic, HeadStart
Advanced Environment, Floppy Drive,
Framework II, 3-D Graphics, ATI and
Computer-TEZ, Tutorial Software, Xerox hard
disk manager, Publish-It! Chessmaster 2000,
Splash VGA, paint program, Benchmark, plus
Turbo and Shell.

HEADSTART ADVANCED OPERATING ENVIRONMENT is a trademark of VenDEX Technologies, Inc. While a trademark of International Business Machines Corp. MICROPROCESSOR is a trademark of Intel Corp. FRAMEWORK II is a trademark of Software Sea Ltd. GRAPHICS is a trademark of Perspective. FLOPPY DRIVES is a trademark of Concept Technologies. XTREK is a trademark of Executive Systems, Inc. PUBLISH-IT! is a trademark of International Software Corporation. CHAMPS is a trademark of VenDEX Technologies, Inc. CHAMPSMASTER 2000 is a trademark of International Software Corporation. VENDEX TO USE YOUR PC is a trademark of American Shipping International. BENCHMARK is a trademark of Benchmark International. PUBLISH-IT! is a trademark of International, Inc. © 1988 VenDEX Technologies, Inc. All Rights Reserved. VENDEX TECHNOLOGIES, INC. 405 COVE - 08840, Suite 408, Great Neck, New York 11021.

VENDEX HEADSTART III

Built to be compatible with you.™

CIRCLE 731 ON READER SERVICE CARD



The \$2,275 PS/2 version of the EiconScript Card requires both a standard serial or parallel interface and a custom video interface to the printer.

68000 processor, a reversible cable, and revised documentation. The new version will sell for the same list price as the current version.

With its uneven documentation, poor performance, and questionable quality control, the EiconScript does not present a particularly attractive value as it now stands. But the planned new release may make it more competitive.

PRINCETON PUBLISHING LABS INC.

PS-388 Accelerator

The Princeton Publishing Labs PS-388 Accelerator was a latecomer to the party at PC Labs, but this just shows Fate's trick of saving the best for last.

At first glance, the PS-388 looks typical of the breed. It includes a heavy, sandwiched board with lots of chips and an 8-bit edge connector, which the manual suggests can be installed either in an XT- or an AT-compatible machine. It will work in a network file server. Like the others, it connects to a simple card in the LaserJet by means of a special 25-pin cable. It comes with 3MB of memory and a full complement of 35 Bitstream font outlines. In order to maintain full compatibility with the Adobe fonts, the Bitstream Swiss and Dutch fonts can be accessed using the Hel-

vetica and Times Roman font designations.

Installation and use is a breeze. Because you install it as a standard parallel port, the board can be used from almost any program. You won't need to worry about installing trouble-prone drivers; you can configure the board as LPT1, LPT2, or LPT3, with LPT2 as the default setting. At the same time, you don't lose your Laser-

Jet—you can leave it hooked up to your computer through another parallel or a serial port and still access it directly using another DOS device name.

But this breeze is nothing compared to the gusts you'll feel as the pages come flying out of your printer. The PS-388 had the best overall performance of any board tested, walking away from the competition in the graphics and text speed tests, with the exception of the complex PostScript Graphic Times test, in which it placed a close second to the ConoDesk 6000. It faithfully produced all the sample pages and did not appear to have any problems with the test files. Compared to a stand-alone PostScript printer, this combination is unbeatable.

RISC IS THE ANSWER The PS-388's secret lies in its dedicated RISC processor, developed by Weitek specifically for PostScript controllers. According to information from Princeton Publishing Labs, the processor is capable of 10 mips (million instructions per second), which far outstrips even the most powerful PC. This advanced technology gives the card more power to convert your application's PostScript commands into an image and then into video signals for the printer.

If the PS-388 has a weak link, it is its documentation. We were given a prelimi-



An advanced RISC microprocessor and ample memory push the Princeton Publishing Labs PS-388 Accelerator (\$2,795) to the head of the pack.

One of the most important reasons
for buying our new LaserJet IID printer
is on the other side of this page.

One of the most important reasons
for buying our new LaserJet IID printer
is on the other side of this page.



The latest member of the HP LaserJet printer family prints on both sides of the paper. But that's just the icing on the cake.

The LaserJet IID printer is full of new ideas for making paper-handling easier and more efficient.

An envelope feeder accessory, for one. Instead of having to feed envelopes manually, our new printer does it automatically.

You wanted more paper trays. So the LaserJet IID printer has two of them, each with a 200-sheet capacity. Give us more fonts, you said. And LaserJet

Series II compatibility. Done!

So now you have a choice of two HP LaserJet printers. Both with that superb quality for text and graphics you've come to expect from Hewlett-Packard.

All good reasons to call 1-800-752-0900, Ext. 297A for the name of your nearest dealer.



**HEWLETT
PACKARD**



Shades of Compatibility, Subtle Differences

Some PostScript add-in boards are more equal than others. That's the conclusion we came to when we found subtle differences in the output produced by some of the boards on the PC Labs PostScript Graphics Times test. In fact, the QMS JetScript was the only product tested that replicated the output of an Apple LaserWriter II, the PostScript printer against which all the products were compared. That didn't surprise us, however: the JetScript was the only board tested that, like the LaserWriter, uses Adobe PostScript rather than a PostScript clone.

Shown here are some of the line and not-so-line discrepancies that can occur when you use a product that isn't completely Adobe PostScript compatible. Although our PostScript Graphics Times test was not designed to be a compatibility test, it should give you some idea of the kinds of problems you might encounter when using these products. For comparison, we've included a sample printed on the Apple LaserWriter II so that you could see how far from the mark some of these products have strayed.

The Princeton Publishing Labs PS-388 Accelerator board—the latest of the group—saves time in part by using straight lines to fudge Bezier curves. But we found a less perceptible problem with the output produced by this and some other boards: they do not use the same arc spacing as does Adobe PostScript. The Destiny PageStyler, EiconScript Card, and the Princeton Publishing Labs PS-388 Accelerator use the Bitstream library of type fonts, which is width-compatible with that of Adobe but looks somewhat different.

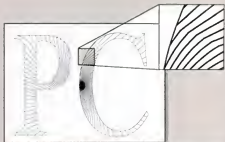
Several boards that use PostScript clones showed roughness in their font-smoothing process. You can see it in the jaggedness at the top of the "P" in the ConoDesk 6000 graphics sample and in the top hook of the "C" in the QMS PC Publisher Kit Series II sample. Other boards may produce similar results with other letters.

Freedom of Press, one of the two software PostScript emulators tested, failed to properly handle the densely spaced Bezier curves near the center of our image. After 9 minutes of processing, it delivered faulty output. *Freedom of Press* also drew thinner, less-well-defined lines than the other products tested.

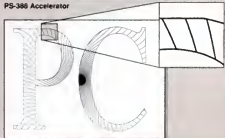
If you regularly need to produce Bezier curves or smoothly scaled fonts, you might not want to consider a product that cuts corners on these features. But if you will be generating normal-sized fonts and more common graphic elements, you may never run into these problems. Differences in implementation, such as using a type library other than Adobe's, will cause problems only if you are prototyping output destined for a true PostScript device. But these differences may be great enough to affect the overall look of your output.



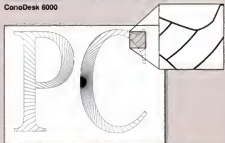
Apple LaserWriter II



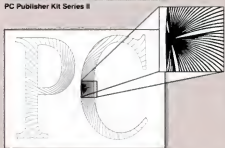
PS-386 Accelerator



ConoDesk 6000



PC Publisher Kit Series II



Freedom of Press

GETTING POSTSCRIPT THE CHEAP WAY

Two software products—GoScript and Freedom of Press—offer easy and inexpensive upgrade paths to PostScript for the printer you already own.

Like many languages, the PostScript page description language must be interpreted before it can be executed. Buying a printer smart enough to interpret PostScript code is an expensive proposition: on the average, printers that use a licensed version of the PostScript interpreter cost \$2,000 more than those that don't.

However, it's possible to interpret PostScript code using your computer's processor rather than a special processor in a printer—and to save a lot of money in the process. After your computer stores the resultant bitmap image in memory, it can send the file to a non-PostScript-compatible laser, ink jet, or even dot matrix printer using ordinary drivers.

Two software products—LaserGo's *GoScript* and Custom Applications' *Freedom of Press*—let you do just that. And at prices of \$195 and \$495, respectively, these programs may be the cheapest implementations of PostScript for a long time to come. *Freedom of Press* duplicates the 35 fonts supplied with the Apple LaserWriter NTX, while *GoScript* mimics the 13 fonts of the original Apple LaserWriter. LaserGo is also planning to release a \$395 version of *GoScript* that will handle 35 fonts.

TWO LIMITATIONS By choosing to go the software route to PostScript compatibility, you'll keep your costs down, but you'll have to accept two major limitations inherent in the technology used by *GoScript* and *Freedom of Press*. First, you cannot use either of these software translators from within your application program. While in *Ventura* or *PageMaker*, you must print your file to disk. Only after exiting the application can you

print the image—but you must always do so in batch mode from the DOS prompt. Certainly, this is a drawback if you like to check your work periodically with paper proofs.

The second limitation is that you must dedicate your computer's processor to the job of interpretation and memory management. One of the reasons that the PostScript interpreter was originally built into the Apple LaserWriter was to free the computer from the time-consuming task of translating large graphics files. Both *GoScript* and *Freedom of Press* took well over an hour to print out a 5-inch-square sample halftone. While they

were processing the graphics file, the computer was unavailable to any other application.

Further testing in PC Labs revealed the performance trade-offs that you must make in order to use these products. Large text files, surprisingly, took the longest to print out. In fact, both programs averaged about 1 page per minute on a 20-page document. Compare that result with the 7.8 pages per minute for the Apple LaserWriter NTX. But in spite of the fact that neither program supports Adobe's proprietary font outlines (both programs use Compugraphic and Bitstream fonts instead), the letter forms that



FACT FILE



Freedom of Press, Version 1.0a
Custom Applications Inc.
5 Middlesex Technology Center
900 Middlesex Turnpike
Billerica, MA 01821

(800) 873-4367

(508) 667-8585

List Price: \$495

Requires: 500K RAM, 4MB disk space, 512K EMS, DOS 2.1 or later.

Printers Supported: AVR-megabuffer, BlaserStar 2, Canon BJ130, Canon LBP, Epson LQ, Fujitsu DL, Fujitsu Laser, HP DeskJet, HP LaserJet, IBM-X24, J-Laser, NE P-5, Olivetti PG108, PCL Compatible, PCPI LaserImage, Siemens PT 88S-32, Siemens PT90-12, Tandy-DMP

In Short: A PostScript interpreter that duplicates the brains and 35 fonts of the Apple LaserWriter NTX via software—at about half the speed and one-tenth the price.

CIRCLE 426 ON READER SERVICE CARD



GoScript, Version 2.03
LaserGo Inc.
9235 Trade Pl., Suite A
San Diego, CA 92126
(619) 530-2400

List Price: 13-font version, \$195; 35-font version, \$395

Requires: 550K RAM, 1.5MB disk space, 1MB EMS, DOS 3.0 or later.

Printers Supported: Canon BubbleJet BJ 130, Canon LBP-8 II, Epson FX Series, Epson LQ Series, HP DeskJet, HP LaserJet Plus, HP LaserJet Series II, HP PaintJet, IBM ProPrinter, NEC PinWriter, Toshiba 24-pin

In Short: A PostScript interpreter that duplicates the 13 fonts in the original Apple LaserWriter. This inexpensive program doesn't offer many enhancements, but one nifty is its interactive mode, which lets you issue single PostScript commands that will be executed as you type them—a great feature for beginning PostScript programmers.

CIRCLE 427 ON READER SERVICE CARD

they produced were flawless.

Based on how long it took to print our sample text files, I fully expected to sleep at PC Labs while printing the graphics test document, but I was wrong. *GoScript* took 853 seconds—and *Freedom of Press* 543 seconds—to execute the test. That's not faster than the Apple LaserWriter NTX, which completed the test in 436 seconds, but it is more than 5 minutes faster than several other PostScript-compatible printers, among them the Apple LaserWriter NT, the Qume Scripten, and the IBM PagePrinter—impressive for such low-cost programs.

MORE TO IT THAN SPEED But speed alone doesn't constitute good performance. Earlier versions of *GoScript*, for instance, did not support all PostScript commands. Moreover, the Set Screen command, which is used to generate certain fill patterns, did nothing more than generate an interpreter error in an earlier version. The current version of *GoScript*, 2.03, which is shipping now, won't balk when it encounters this command. But instead of printing the correct diagonal pattern, it filled our test image with solid black. Moreover, when you select a pattern from a menu, you won't know whether or not it uses the Set Screen command. The *GoScript* manual should include a list of the fill patterns it does not support.

We didn't experience these problems with *Freedom of Press*. Besides being an almost bulletproof interpreter, *Freedom of Press* includes several enhanced features. Batch files make it easy to specify the default printer or to specify a substitute printer driver on the fly. *Freedom of Press* also has on-line help; it's really just an electronic crib sheet of the printers that

the program supports, but it's helpful nonetheless.

Both *Freedom of Press* and *GoScript* allow you to modify the print command slightly, so that you can print more than one file at a time or print multiple copies of one file. *GoScript*'s enhancements aren't many, but one feature that does distinguish this product is its interactive mode. You can issue single PostScript commands that will be executed as you type them, which is great for beginning PostScript programmers.

RETROFITTING POSTSCRIPT

More than anything else, *Freedom of Press* and *GoScript* offer easy and inexpensive upgrade paths for the printer you already own. By including Hewlett-Packard LaserJet and Epson drivers, these programs make it possible to bring PostScript compatibility to almost any printer on the market.

Both LaserGo and Custom Applications have promised color PostScript interpreters within the year. Couple that with the fact that both vendors supply drivers for the HP PaintJet and 24-pin dot matrix printers, and you have a \$500-and-under alternative to the \$25,000 QMS ColorScript Laser.

The best news about programs of this kind—and you can expect to see a few more on the market in the next few months—is that they prove that the PostScript language itself is robust enough to stand up to enhancements, clones, and kludges. All of which is necessary if PostScript is to become accessible to users at all levels of expertise, and with all kinds of equipment.—Luisa Simone

Luisa Simone is an executive editor of PC Magazine.



EDITOR'S
CHOICE

FACT FILE

PS-388 Accelerator

Princeton Publishing Labs Inc.
19 Wall St.
Princeton, NJ 08540
(609) 924-1153

List Price: \$2,795

Requires: No RAM needed in host system; PC, XT, AT, PS/2 Model 30, or compatible; HP LaserJet Series II. Installable in network servers.

In Short: Blazingly fast, easy to install, and simple to operate, the PS-388 is worth every penny if you need to get the best performance out of your LaserJet Series II investment with PostScript applications. Aside from unfinished documentation, it seems to suffer from none of the shortcomings or difficulties of its competitors.

CIRCLE 420 ON READER SERVICE CARD

nary version with missing illustrations and other rough edges. A section described an Epson LQ emulation mode that does not exist. But these are small faults in light of the PS-388's performance and ease of use. In fact, after the first 20 minutes or so, you probably won't need to refer to the manual at all.

The PS-388 is the most expensive board tested here. Yet even at that higher price, it represents the best value. At \$2,795, the board costs relatively little more than its competition, yet it offers dramatically increased performance. In short, this one is a winner.

QMS INC.

JetScript

QMS has long had a reputation in the field of PostScript. That company was the first to come in with a replacement controller for the original LaserJet and LaserJet Plus printers, which gave these machines PostScript capabilities through the electronic equivalent of a brain transplant. QMS has made headlines more recently with its line of color PostScript printers.

So it should hardly come as a surprise that QMS also has a PostScript adapter for the Series II. The \$2,495 JetScript has a Motorola 68000 microprocessor with 3MB of RAM standard. One small distinction is that the processor runs at 16 MHz

The Diconix 150 printer. Completes The silent partner



most any system. Quietly.
that fits in a briefcase.



EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650
1-800-DICONIX

CIRCLE 363 ON READER SERVICE CARD



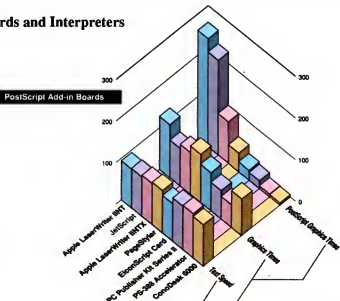
Benchmark Tests: PostScript Add-in Boards and Interpreters

The big news in our roundup is that these PostScript boards are strong performers, outstripping the Apple LaserWriter IINT, the standard against which we compared them. Clearly, a strong factor in this outcome is the efficiency of the PostScript interpreter. Of the boards we tested, only QMS's JetScript uses a licensed copy of Adobe Pct-Script—which contributes to its slow times. The JetScript enhances the performance somewhat, however, by pushing its Motorola 68000 processor from 12 MHz to 16 MHz. If you insist on the real thing, the JetScript is a solid performer in this class.

The rest of the boards all use PostScript clone interpreters, and they shaved anywhere from 83 to 98 percent off the PostScript Graphics Times the LaserWriter IINT achieved. All of them even surpassed Apple's leading machine, the 68020-based LaserWriter IINTX.

Princeton Publishing's PS-388 Accelerator and Conographic's ConoDesk 6000, with their custom processor chips, were among the speediest boards tested. By contrast, the PC Publisher Kit Series II uses an ordinary 68000 processor chip but still chalks up an overall performance record surpassed only by the PS-388 Accelerator (which was the very fastest on text and standard graphics, and second-best on the PostScript graphics test). Remember, however, that if you use a board based on a PostScript clone, what you gain in speed you may lose in compatibility.

As for the software PostScript emulators (which we tested on an 8-MHz IBM AT): with text printing speeds of only about one page per minute, they are clearly not for everyone. They do somewhat better at



Throughput Tests
(Taller bars represent better performance)
Relative Performance
(Apple LaserWriter IINTX = 100)

Performance Time Tests
(Shorter bars represent better performance)
Relative Time
(Apple LaserWriter IINTX = 100)

Throughput Tests
(Results given in pages per minute)

Performance Time Tests
(Results given in seconds)

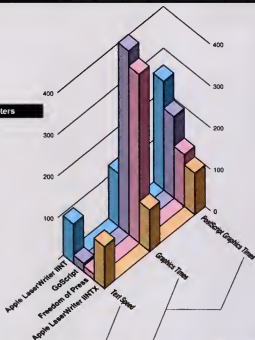
	Text Speed	Graphics Times	PostScript Graphics Times
Apple LaserWriter IINT	6.40	48.20	1,135.00
JetScript	6.50	33.96	996.00
Apple LaserWriter IINTX	6.80	37.93	436.00
PageStyler	7.03	44.14	196.80
ElconScript Card	6.21	35.06	103.50
PC Publisher Kit Series II	7.16	26.03	83.00
PS-388 Accelerator	7.26	21.05	30.43
ConoDesk 6000	6.79	33.67	24.51

graphics, outstripping the LaserWriter IINT on the PostScript graphics test, though lagging far behind it in the standard graphics test.

Freedom of Press was the more efficient of the two packages, beating GoScript on both graphics tests and—surprisingly—approaching the

time achieved by the LaserWriter IINTX in the case of the PostScript test. If most of your PostScript work involves graphics, and if you can tolerate the inconvenience of writing your PostScript output to a file before printing, one of these two products may be a serviceable low-cost option.

PostScript Interpreters



Throughput Tests
(Taller bars represent better performance)
Relative Performance
(Apple LaserWriter IINTX = 100)

Throughput Tests
(Results given in pages per minute)

	Text Speed	Graphics Times	PostScript Graphics Times
Apple LaserWriter IINT	6.40	48.20	1,135.00
GoScript	1.35	167.16	854.95
Freedom of Press	0.92	153.47	543.00
Apple LaserWriter IINTX	6.80	37.93	436.00

Performance Time Tests
(Shorter bars represent better performance)
Relative Times
(Apple LaserWriter IINTX = 100)

Performance Time Tests
(Results given in seconds)

The **Text Speed** test prints a two-page single-spaced business letter: one copy for dot matrix printers, ten copies for laser printers. Print speed is measured in characters per second for dot matrix printers and in pages per minute for laser printers. Because the test document simulates a typical business letter with lots of white space, the speeds achieved by dot matrix printers are almost always much slower than their manufacturers' rated speeds, which are based on printing a single full line of characters.

The **Graphics Times** test uses a file with lines, rectangles, circles, and several fill patterns, which is

stored in an output file on-disk using Microsoft Windows and printed three times using the DOS COPY command. The reported result is the average time per page over the three trials, given in seconds. A separate set of tests is run for each standard emulation that the printer supports.

The **PostScript Graphics Times** test clocks the processing speed of PostScript printers. It uses two large characters as a clipping area and draws a series of Bezier splines. The time reported is the number of seconds it takes to print a page

(however, the processor chip in our evaluation unit was rated at only 12 MHz). A large, 8-bit expansion board fits in the computer, with a typically small card for the printer, connected by a 37-pin cable. It can also be installed in a network file server. The installation program gives clear instructions on how to configure the board by setting two jumper blocks.

GENUINE POSTSCRIPT When it comes to soft drinks, everyone knows which one is the real thing. And when it comes to PostScript, the real thing is Adobe Systems. The big difference between the JetScript and its competitors is that it is the only one based on Adobe's PostScript. While none of the other systems based on "PostScript-compatible" interpreters made significant errors during our testing, some users will prefer to have the confidence and compatibility that come with using the genuine article.

The JetScript takes over one of the computer's parallel port assignments: either LPT1, LPT2, or LPT3, so you can easily configure any PostScript application program to send its output to the designated port. The installation program makes the decision easier by polling these three devices to find a free port that it can use. (If all three ports are in use, the installation program halts with an error message.)

You can leave your LaserJet hooked up with the parallel or serial connection that



FACT FILE

JetScript

QMS Inc.
1 Magnum Pass
Mobile, AL 36618
(205) 633-4300

List Price: \$2,495

Requires: 2MB RAM, HP LaserJet Series II printer. Installable in network servers.

In Short: The JetScript is the only add-in card reviewed here that offers the security of genuine Adobe PostScript, and it can be installed in a network server for shared use. But despite its 16-MHz processor, it is far back in the pack in terms of performance. Though easy to install and use, its faster competitors offer more for the money.

CIRCLE 421 ON READER SERVICE CARD

■ POSTSCRIPT ADD-IN BOARDS



The Adobe PostScript version used by the \$2,495 JetScript is significantly slower than the PostScript clones used by its competitors.

was in place before the JetScript was installed. Consequently, you can have access to both a PostScript and a LaserJet printer simply by using different DOS ports for printer output.

Once installed, JetScript is simple to use. Statements in your computer's CONFIG.SYS and AUTOEXEC.BAT files take care of initializing the card and loading PostScript into the board's memory at power-up. This takes only about a minute on an 8-MHz AT. The board's contents will survive a warm reboot, so you need do this only when you turn on the power to the computer at the beginning of the day.

Despite its faster CPU speed, the JetScript was one of the slower performers in our tests. Thus it will appeal primarily to those who want genuine Adobe PostScript in a trouble-free package. However, its list price is above the average for the six products, and those who are less picky about their PostScript's family background will find faster and less expensive alternatives to choose from among the clone products.

QMS INC. PC Publisher Kit Series II

The second entry from QMS started life as the Imagen PC Publisher Kit. Since Imagen was purchased by QMS, however, the

product has been marketed by The Laser Connection.

The \$1,995 Publisher Kit Series II's notable distinction is its support for DDL, an alternate page-description language to PostScript. A number of desktop publishing programs can create DDL output, including *Ventura* and *PageMaker*.

But the Publisher Kit also offers PostScript support through two different meth-

ods. The first allows you to print from PostScript commands that have been stored in a disk file. The second approach takes over a parallel port and directs the output through the Publisher Kit system. A simple command at the DOS prompt turns



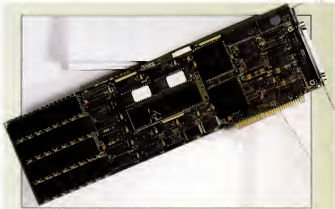
FACT FILE

PC Publisher Kit Series II

QMS Inc.
1 Magnum Pass
Mobile, AL 36618
(205) 633-4300
List Price: \$1,995

Requires: No RAM needed on host system; 2.8MB of free hard disk space; HP LaserJet Series II printer. Third-party software package required for installation in Novell network servers. Other networks not supported.
In Short: In the top half on performance and next to the bottom in price, the PC Publisher Kit Series II is flexible, easy to install, and very cost-effective.

CIRCLE 482 ON READER SERVICE CARD



The PC Publisher Kit Series II offers both PostScript and DDL support, as well as many other useful programs, at a low price of \$1,995.

Publisher's Paintbrush™

The art of desktop publishing



This masthead was created using the fonts and typographic features of Publisher's Paintbrush.



Gray scale technology gives your images amazing clarity - with up to 256 shades of gray.

Z-SOFT

450 Franklin Road / Suite 100
Marietta, Georgia 30067
(404) 428-0008
FAX: (404) 427-1150
Telex: 6502859318

Voted "Best
Desktop Publishing
Utility"



CIRCLE 744 ON READER SERVICE CARD

Publisher's Paintbrush is a trademark of ZSoft Corporation. Ventura is a trademark of Ventura Software, Inc. PC Magazine is a registered trademark of Active Corporation. Type Director and CO are trademarks and IntelliFont is a registered trademark of Compugraphic Corporation.

Desktop publishing's favorite graphic tool now brings you new levels of creativity and page perfection. Publisher's Paintbrush™ now has two exciting enhancements - gray scale and Compugraphic Intellifont® technologies. Suddenly, you're in the same league with professional printers and typesetters!

Gray scale publishing: For the ultimate image.

Gray scale technology is a major advance over the conventional "dithering" technique, which simulates shades of gray by varying the density of black dots.

Gray scale images, composed of dots in up to 256 intensity levels, have distinct shades of gray much cleaner than "dithered" images.

Now you can edit a gray scale image with all the features that made Publisher's Paintbrush the premier package of its class. Then export your masterpieces to Ventura Publisher™, PC PageMaker® or business presentation software.

Fonts galore!

Publisher's Paintbrush offers 25 popular

fonts - including a selection in Compugraphic outline format. Hundreds of other perfectly formed outline fonts are available from ZSoft. So your desktop publishing documents gain impact with razor-sharp type.

You have complete flexibility with your type. Adjust leading (line spacing) and kerning (character spacing). Adjust type size - from 1 to 200 point. Adjust italic slope or line slope in 1-degree increments.

Many other popular features.

Publisher's Paintbrush provides the most extensive hardware support in the industry and your images can be used in all major desktop publishing packages.

With zoom out editing, all your editing is done at the resolution of the print device - not the screen. Result: Incredibly smooth edges.

And, our new import utility converts Hewlett-Packard printer files to PCX for post-process editing.

Join the graphic era of desktop publishing.

Give your documents and presentations the classy look they deserve. With Publisher's Paintbrush. Clearly, it's the art of desktop publishing.

© 1988 ZSoft Corporation



TOWARD A COMPETITION-GRADE LASERJET

Some people find that they do not need everything that PostScript offers. If all you want is more speed or flexibility from your LaserJet Series II, here are some options to consider.

These boards work by processing the regular LaserJet commands faster than the printer's controller. They offer scalable fonts through Bitstream *Fontware*, which creates LaserJet-compatible soft fonts in a wide variety of sizes and attributes from font outlines. These products also give you features beyond the functions of PCL (printer control language) and support high-speed output from desktop publishing programs through proprietary drivers.

In either case, although you won't be able to print from the same PostScript files as your large typesetting machine, you should be able to print desktop publishing or presentation graphics pages much faster than with an unmodified LaserJet.

TALL TREE SYSTEMS JLaser Plus AT4

The JLaser Plus AT4 from Tall Tree Systems consists of the JRam memory expansion card that fits inside the computer and a small JLaser daughtercard that rides on top. This assembly connects by means of a 25-pin cable to the JSX adapter card that fits into the expansion slot of the LaserJet Series II.

You can use the versatile JLaser in a number of ways. It can be addressed as a standard LaserJet using the standard PCL commands. The system also comes with drivers for *Windows* and *Ventura Publisher*, so that you can use it to get high-speed output from these desktop publishing programs.

As it comes in the JLaser package, *Fontware* includes the Bitstream outlines for the Courier, Times Roman, and Helvetica type-style families, plus a symbol typeface. This selection gives you the same set of 13 type-style options that make up the basic PostScript comple-

ment. As a plus, you also get Bitstream Charter, an attractive font designed specifically for laser printers.

The package comes with a number of other useful programs and utilities, including JBanner, which uses the Bitstream font outlines to create text pages on the fly, without having to create the full font first and store it on-disk. As the name implies, it can be used to create banners, signs, or presentation text charts. The system can also generate display fonts, so that your screen will match what's on the printed page.

ENHANCED GRAPHICS The JLaser system adds some new capabilities to your LaserJet printer, most notably an enhanced graphics mode that allows printing at a resolution of 300 by 600 dots per inch in addition to the standard 300 by 300 dpi. At present, this feature is supported only by a few graphics programs, but Tall Tree Systems is developing drivers for desktop publishing programs so that they can take advantage of the extra resolution.

The JLaser system is fairly easy to in-

stall and run, thanks to its installation batch files. You may find that the installation process gets somewhat more difficult, however, if you depart from the default settings. The documentation is acceptable but nothing to crow about. It is spread over four separate booklets, and the information you need can be difficult to find.

If what you need is speed and scalable font outlines and you use your LaserJet printer primarily for desktop publishing, then the JLaser Plus cards offer a good low-cost alternative to a PostScript add-in card.

LASERMASTER CORP. LaserMaster LC2 CAPCard Controller

The LaserMaster CAPCard is best suited for one purpose: producing desktop publishing pages quickly from LaserJet printers. Originally designed for use with *Ventura Publisher*, it now has a driver for *Windows* so that you can use it with *PageMaker* as well.

The CAPCard system consists of an



FACT FILE

JLaser Plus AT4

Tall Tree Systems
2585 East Bayshore Rd.
Palo Alto, CA 94303
(415) 493-1980

List Price: Model AT2, \$699; Model AT4, \$749; JSX adapter and cable (required), \$140.

Requires: 1MB RAM, HP LaserJet Series II printer.

In Short: The JLaser kit is a low-cost speed-up for your LaserJet Series II. It uses the PCL command language and also supports *Windows* and *Ventura* through special drivers. The system comes with the Bitstream

Fontware programs and 14 font outlines for the Courier, Times Roman, and Helvetica type-style families, which add significantly to the overall value of the package.

CIRCLE 428 ON READER SERVICE CARD

LaserMaster LC2 CAPCard Controller

LaserMaster Corp.
7156 Shady Oak Rd.
Eden Prairie, MN 55344
(612) 944-6069

List Price: Standard version (without scaling fonts), \$1,490; enhanced version (with 13 fonts), \$1,980; enhanced version plus (with 35 fonts), \$2,285.

Requires: 640K RAM (to run most applications), 6.5MB hard disk space for precached fonts; Brother HL-8, Canon LBP-8ii, or HP LaserJet Series II printer.

In Short: The LaserMaster CAPCard costs about as much as the PostScript boards but takes a different course. It creates fonts on the fly and performs quickly, but uses custom drivers and an extended PCL command set to communicate with applications.

CIRCLE 429 ON READER SERVICE CARD



EDITOR'S CHOICE

• PS-388 Accelerator

The six PostScript add-in boards reviewed here offer a performance advantage over standalone PostScript printers. But is that enough to make the HP LaserJet/add-in board combination a better buy than a standalone PostScript printer?

If you pay list price for an HP LaserJet and one of the add-in boards that were among the performance leaders in our benchmark tests, you'll spend more than \$5,000. That's more than the cost of some PostScript printers, notably our Editor's Choice from our last roundup of printers, the Apple LaserWriter IINT. In fact, you may have to pay list price for these boards, since they do not yet command a demand sufficient to bear a widespread discount.

Aside from price, two other considerations are worth noting. Many PostScript printers now offer LaserJet emulation through the PostScript controller, which means you have access to scalable fonts through LaserJet commands. This is not the case with add-in boards, which generally rely on the LaserJet controller for the HP command set.

Still, no standalone printer comes close to the performance of the best boards in the group, so if raw speed is your primary concern, an add-in board is the best buy. The clear winner here is Princeton Publishing Labs' PS-388 Accelerator.

It costs a bit more than the others but its performance puts it so far out in front that it's worth the money. Moreover, a major factor in its high price is the fact that it comes with 500K to 1MB more RAM than every other system except one.

The Weitek RISC processor plays a big role in the PS-388's speed, bringing to it a level of performance that has until now been confined to the world of high-tech engineering workstations. The PS-388 is more than just fast, however. It is one of the easiest of the bunch to install and operate, no matter what application you are using to drive it.

We must point out, however, that if you're looking for complete compatibility with Adobe PostScript, you won't find it in the PS-388 or any other add-in board that uses a PostScript clone. In most cases, cutting corners on compatibility is the price that must be paid for speed. If 100 percent Adobe PostScript compatibility is your highest priority, you will be best off considering the \$2,495 QMS JetScript, which is the only board tested that uses the real thing rather than a clone.

Honorable mention is due the PC Publisher Kit Series II from QMS Inc. It is in the top half of the pack in terms of performance, yet manages to offer the next-to-lowest list price of all. This one is the bargain hunter's selection.

8-bit expansion card for your computer, plus an option card for your LaserJet Series II printer. Unlike any other board set tested in this review, the CAPCard uses a simple cable with modular phone plugs for the connection. It seems hard to understand how so much data flies through those few wires, but it works all the same.

SOFT FONTS ON THE FLY Like the JILaser, the CAPCard relies on Bitstream outline fonts, and it comes with either 13 or 35 font outlines, depending on the version you purchase. With most Bitstream products, you must use the Fontware program to generate soft fonts, which are stored on the disk and then downloaded to your printer each time you start it up. That's not the case here; the CAPCard creates the fonts on the fly, so you don't need to use up great portions of disk space for font files. As an added benefit, the font outlines use the same character-width tables as do Adobe PostScript fonts, so your final output should look more like PostScript pages.

Installation and setup are fairly quick and straightforward. The manual is well written, and there are installation batch files that help you get all the programs copied to your hard disk so that the card can find them. You'll find that handy utilities make it easy to use the system once it is installed.

The CAPCard can accept output from any application that sends out LaserJet commands, and it handled the PC Labs printer tests without a problem. More likely than not, however, you will buy this card to use with its own Ventura or PageMaker drivers for the faster output performance it offers.

You may hesitate to spend as much for the CAPCard as for a PostScript board, and if you need to send output to a typesetter regularly, the latter will definitely be more useful. But if you produce all your pages on your LaserJet, the CAPCard is worth your consideration.—Alfred Poor

Control, a specialized version of the LaserControl setup and emulation program for page printers. The DDL LaserControl program allows your laser printer to emulate various popular line printers by converting their commands into DDL on the fly and then printing the DDL output. This handy feature makes it possible for you to use the

PC Publisher Kit with programs that do not support the LaserJet or PostScript—for example, by emulating an Epson dot matrix printer.

SIMPLE BUT FAST The PC Publisher Kit has an 8-bit expansion card with a 68000 processor and 2MB of memory, a



Our Printer Sharing Unit Does Networking!

An Integrated Solution

Take our **Master Switch™**—a sophisticated sharing device, combine it with **MasterNet™** networking software for PCs, and you've got an integrated solution for printer and plotter sharing, file transfer, electronic mail, and a lot more. Of course you can also share modems, rams, and mainframes or access the network remotely. Installation and operation is very simple.

Versatile

Or you can use the Master Switch to link any computer or peripheral with a serial or parallel interface. The switch accepts over 20 commands for controlling the flow of data. It may be operated automatically, by command, or with interactive menus. Its buffer is expandable to one megabyte and holds up to 64 simultaneous jobs. The

MasterLink™ utility diskette for PCs comes with every unit and unleashes the power of the switch with its memory-resident access to the commands and menus.

Other Products

We have a full line of connectivity solutions. If you just want printer sharing, we've got

it. We also have automatic switches, code-activated switches, buffers, converters, cables, protocol converters, multiplexers, line drivers, and other products.

Commitment to Excellence

At Rose Electronics, we're not satisfied until you're satisfied. That's why we have thousands of customers around the world including large, medium, and small businesses, factories, stores, educational institutions, and Federal, state, and local governments. We back our products with full technical support, a one-year warranty, and a thirty-day money-back guarantee.



**ROSE
ELECTRONICS**

Give a Rose to your computer.

Call now for literature or more information.
(800) 333-9343

P.O. Box 742571 • Houston, Texas 77274 • Tel. (713) 833-7873 • FAX (713) 833-0044 • Telex 434688

CIRCLE 290 ON READER SERVICE CARD

To complete your library of PC Magazine send \$8.00 for each back issue ordered (\$9.00 in Canada, U.S. funds only) to: Ziff-Davis Publishing Company, P.O. Box 5999, Cherry Hill, NJ 08034, Attn: F. Hunter. Be sure to include month and year of the issue ordered. **For faster service call 1-609-354-4975.**



■ ADD-IN BOARDS

small card for the printer, and a 37-pin cable. Installation is a snap because there are no settings to contend with on any of the boards; everything is handled through the installation software. The manual shows all the steps clearly and includes screen shots showing the lists of filenames that will appear as the software is copied onto your hard disk.

The unit turned in some impressive performance times, especially when you consider it has the second-lowest list price of the group. But we did run into two problems while testing this as a PostScript printer; both occurred while printing from files of PostScript commands. In one case where the PostScript Executive command came at the top of the file, the Publisher Kit's software and DOS fought over access to the disk, slowing performance to a

■ **The PC Publisher Kit** turned in some impressive performance times, especially when you consider it has the second-lowest list price of the group.

crawl; however, this problem is unlikely to arise in most applications. The system also refused to print a file that ended with the DOS end-of-file character (Ctrl-Z), which might give you trouble if you create or edit PostScript files with a word processor instead of generating them directly from your applications.

Overall, the PC Publisher Kit represents an attractive value. With support of DDL, it is suitable for desktop publishing applications. Possibly the best choice if you want to get the best performance for the least money, it is well worth a look. **DB**

Alfred Poor is a consultant and analyst in Perkasie, Pennsylvania, and a frequent contributor to PC Magazine.

YOUR FAVORITE KEYBOARD... GUARANTEED! 25% SMALLER FOOTPRINT.



That's right. Guaranteed.

Right off the bat, you're going to wonder what to do with all that extra desk space. Then you'll start typing and you won't believe it.

If it sounds like we're excited about our new keyboard, you're right.

As soon as you get your new ZEOS/RS keyboard, sit down and plug it in.

The first thing you'll notice is a lot of extra space on your desk. The ZEOS/RS (Reduced Size) keyboard is more than 25% smaller than regular 101 Enhanced keyboards yet it features the standard key sizes and layout.

Now start typing.

Can you believe it! That's what we're talking about.

If you don't agree this is the best feeling keyboard you've ever used, return it within 30 days for a full refund.

And that fantastic ZEOS Tactile/Click feel isn't the only thing you'll notice. This keyboard is what speed typing is all about. Our new multi-key rollover feature can handle typing speeds in excess of 100 words per minute.

You not only get the best keyboard made, but you also get that extra ZEOS value. Like an anti-static dust cover at no additional charge. Our famous ZEOS Full Year Warranty, toll free technical support and Expedited Replacement policy are yours too.

Start enjoying your new ZEOS/RS keyboard right away. Order yours now!

ONLY \$89.95

The ZEOS/RS Keyboard, Check These Features!

- 25% smaller footprint than regular 101 Enhanced keyboards, yet standard key size and spacing.
- Multi-key rollover every speed typist will love.
- Superb Mechanical Tactile feel with the perfect "Click."
- Fully XT/AT and PS/2 compatible.
- 30 day full money back guarantee and one year warranty. Anti-static dust cover included at no additional charge.

**ORDER NOW TOLL FREE
800-423-5891**

Open days, evenings and weekends.

FAX Orders Dial: 612-633-2310

In Minnesota Call: 612-633-4591

MasterCard, VISA and C.O.D.

530 5th Avenue NW, St. Paul, MN 55112

Se habla Español.

CIRCLE 723 ON READER SERVICE CARD

A Special Note from the President of ZEOS International:

Why sell our own keyboard?

Well, as you probably know, ZEOS makes some of the best '286 and '386 computer systems around. We sell thousands of them.

Not too long ago we started to notice something. People who bought computers from us were calling back to order extra keyboards. We decided to call and find out why.

These customers told us they love our computers (which we figured) but they love our keyboards too! They were actually going around replacing the keyboards on other brands of computers they already owned. They were switching everything to ZEOS keyboards!

We figured other people might like to replace their old keyboards too. That's why we ran this ad.

I am personally asking you to give this keyboard a try. If you don't like it, we'll refund every dime you paid. Guaranteed.

Greg Herrick, President
ZEOS International, Ltd.



Please add \$5.00 for shipping & handling. Your ZEOS keyboard comes with the standard 6' coiled cable. For an additional 3' cable extension (15' total) add \$10.00. ZEOS keyboards use the standard DIN-type connector as do most compatibles. If you're not sure, contact your computer reseller. For PS/2 style connectors add \$5.00.

XT, AT and PS/2 are trademarks of IBM Corporation. Prices are subject to change without notice. Call for complete warranty details. Available in 32 languages, call to verify stock. ZEOS is a publicly traded company. MFPS/ST FMUL Local UTC.



286V SS

**Complete 12MHz 286
with 32MB Hard Drive!
Only \$1395.00**

It's the fastest, 286 12 you can buy. Workhorse of the industry. Rugged from the ground up. This true Zero-Wait state system features a fast Seagate auto-park hard drive. Nothing can touch it!

- 80286 12 CPU, 6/12MHz Dual Speed keyboard/hardware selectable. Reset and Turbo buttons right up front.
- Zero-Wait State DRAM, 512K expandable to 4MB on the motherboard (16MB System Total). EMS capability!
- Fast 32MB Seagate 138R Hard Drive with auto-park, 1.2MB Floppy Drive.
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/sec transfer rate.
- High-Res Amber Display, Tilt/Swivel Base.
- ZEOS Enhanced 101 Key Keyboard, with Pleasant Tactile/Click Feel.
- Serial and Parallel Printer Ports.
- Clock/Calendar with Battery Backup.
- 6-16 and 2-8 bit expansion slots.
- 80287 support, up to 12MHz.
- Heavy Duty Case complete with Security Lock and LED indicators.

20MHz 286 HARD DRIVE SYSTEM
286/20—At 20MHz, the fastest 286. Complete with our 32MB, 33ms Hard Drive and 1MB RAM. This is what Dazzling Speed is all about. Only \$2095.00

Dazzling Performance.

If you're buying a new computer, ZEOS® is your best choice. Why? Because ZEOS custom builds the best computers money can buy and sells them *factory direct* to you. *PC Resource Magazine* put it this way, "ZEOS...provides quality comparable with the IBM or Compaq and does so for about 70% of the cost."

And a recent review in *PC Magazine* said "comparing the ZEOS with a typical clone is a bit like comparing the Space Shuttle Booster rocket with a helicopter rotor... If you're looking for one of the fastest rides around at a down-to-earth price, don't pass up the ZEOS. Solid construction, flexible design and escape-velocity performance make it a top flight choice."

We couldn't have said it better ourselves.

That's why ZEOS is fast becoming the *preferred choice* of corporate, government and institutional buyers around the world.

That's why it's the best choice for you.

So pick out your dream machine and order it now with confidence. Dazzling performance and

incredible prices await you. *Guaranteed.* Order now by calling 800-423-5891.

YOUR BEST CHOICE!
We don't just say it. We guarantee it. Your new ZEOS system comes with a Full One Year Limited Warranty and our 30 day Full Refund Satisfaction Guarantee. Fully Compatible and Rock Solid. Your best choice without question.

Incredible Prices.

Options Galore. As *PC Magazine* said, "more options than even the most configuration-hungry-hound could possibly need." Including 14" EGA, add \$495. 14" VGA, add only \$695. An incredible selection of hard drives and virtually any other add-on you could want. Call now Toll Free for details 800-423-5891.

All prices and specifications are subject to change without notice. Please call for current pricing and warranty details. ZEOS is a publicly traded company. MPUS/SS Paul Leach UTC ©1989 ZEOS International, Ltd., 530 7th Avenue, N.W. St. Paul, MN 55112



386SX

The New ZEOS 386SX Hard Drive System. Below '286 Prices!

Only \$1895.00

The future is now!

PC Magazine says "386SX-based machines are the right choice..." the new ZEOS 386SX is why. The future is yours now with the new ZEOS 386SX. It's even priced below comparable '286 systems!

- 80386SX 16 CPU, 8/16MHz Dual Speed Keyboard Selectable. Reset/Turbo buttons.
- Zero-Wait State DRAM, 512K expandable to 4MB on board (16 MB System Total).
- Shadow RAM and EMS capability.
- Fast 32MB Seagate 138R Hard Drive, 12MB FDD.
- Ultra high speed Hard/Floppy controller, 1:1 interleave, 800 KB/sec transfer rate.
- High-Res Amber Display, Tilt/Swivel Base, compatible graphics controller.
- ZEOS Enhanced Tactile/Click keyboard.
- High Speed Serial and Parallel ports.
- 6-16, 2-8 bit expansion slots, 80387SX Math coprocessor support.
- ZEOS spare saver case, including Security Lock and LED indicators.



20MHz

Complete ZEOS 20MHz '386 Desktop System. 65 MB Drive!

Only \$2995.00

16 MHz systems also available!



The new '386 desktop standard. Featuring our 64K CACHE (twice that of most competitors) providing Zero-Wait State performance vastly superior to page/interleave memory schemes. Incredible value.

- High speed Zero-Wait 64K SRAM CACHE.
- Genuine 32-bit Intel 80386-20MHz CPU.
- 1MB of Zero-Wait DRAM Expandable to 16MB System Total.
- Fast 65MB Seagate Hard Drive, 12MB Floppy Drive.
- Ultra high speed Hard/Floppy controller, 1:1 interleave, 800 KB/sec transfer rate.
- High-Res Amber Display with Tilt/Swivel Base, compatible graphics controller.
- 101 Key ZEOS Tactile/Click keyboard.
- High speed Serial and Parallel Ports.
- 1-32, 5-16 and 2-8 bit slots.
- 80387 math coprocessor support.
- ZEOS 5-bay case, including Security Lock and LED indicators.



25MHz

Complete 25MHz '386 Vertical System. 65MB Drive!

Only \$3995.00

33MHz systems also available!

ZEOS 25MHz and 33MHz 80386 systems are the fastest, most advanced available anywhere. Review after review, these ZEOS systems are selected as the best price/performance buys. A power-user's dream.

- High Speed Zero-Wait 64K CACHE.
 - Genuine 32-bit Intel 386-25 or 33MHz CPU.
 - 1MB Zero-Wait 32 bit DRAM expandable to 8MB on board plus 16MB 32-bit expansion (24MB total).
 - Fast 65MB Seagate Drive, 12MB FDD.
 - Ultra high speed Hard/Floppy controller, 1:1 interleave, 800 KB/sec transfer rate.
 - High-Res Amber Display, Tilt/Swivel Base.
 - 101 Key ZEOS Tactile/Click keyboard.
 - High Speed Serial and Parallel Ports.
 - 1-32, 6-16 and 1-8 bit slots.
 - 80387 and Weitek 3867 support.
 - Heavy Duty 6-bay Vertical Case.
- Desktop configurations also available.

Order Now Toll Free

800-423-5891



FAX Orders Dial: 612-633-2310
In Minnesota Call: 612-633-4591
MasterCard, VISA and COO
Open days, evenings and weekends
See habla Español.

®PC MAGAZINE EDITOR'S CHOICE 2/28/89

Can your lightweight database handle a heavyweight challenge?

When you have a job that's too much for dBASE or Paradox, turn to the real heavyweight. PC/FOCUS.

PC/FOCUS is the number one fourth-generation language, with its own powerful database system. It's complete enough to create the complex reports and applications that others can't—without resorting to hard-to-learn procedural languages.

With the PC/FOCUS window painter, you can do highly customized, menu-driven applications, with help screens and overlaid windows.

Using just a few words in the PC/FOCUS 4GL, you can put together highly structured matrix reports that include imbedded data, row and column totals, and customized headings. You can create any standard financial report in your preferred format.

And you can draw on as many as 16 different files for one report.

With the powerful PC/FOCUS shared-relational database system, you can report at a level of detail that would otherwise require a large computer. PC/FOCUS can scan 50,000 records in less than three seconds.

And you can access this power through a choice of user

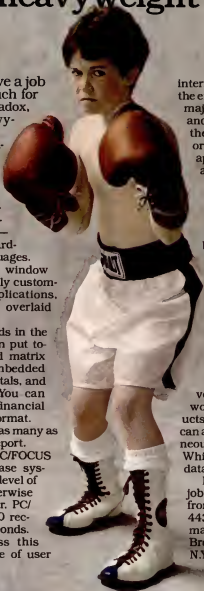
interfaces. A command mode lets the experienced user develop major applications quickly. A point-and-pick windowed interface lets the casual user make a query—or build a substantial application—using only the arrow keys and the enter key.

What's more, any application you develop in the FOCUS language can immediately be run on any of the larger computers supported by FOCUS.

PC/FOCUS includes modules for graphics, statistics, and communications. And there are optional modules including EQL—an English language interface, spreadsheets with goal-seeking capabilities, and interfaces to dBASE and other PC database systems.

There's also a MultiUser version of PC/FOCUS that works with the major LAN products. In a network, up to 32 users can access one database simultaneously without record lockup. While PC/FOCUS maintains your data integrity.

If you've got a heavyweight job to do, get some real muscle from PC/FOCUS. Call 1-212-736-4433, Ext. 3700. Or write Information Builders, Inc., 1250 Broadway, New York, N.Y. 10001.



PC/FOCUS
Information Builders, Inc.

■ PC LAB NOTES ■ GUS VENDITTO

THE ATTRACTION OF PC MAGNET

If you haven't joined the thousands of readers who have already been drawn to PC MagNet, you're missing more than an easy way to download our utilities. Here's a glimpse inside.

When we launched our on-line service, PC MagNet, last year, PC Magazine was breaking new ground in publishing history. Aside from fancy graphics techniques and improved photo quality, today's magazines are essentially the same mixture of pictures and stories that appeared a century ago. And while on-line services have been growing slowly in recent years, PC MagNet represents the first time that a publication has put itself within a local phone call's reach of virtually every reader.

Any reader can call PC MagNet at any hour of the day or night to download programs and batch files, to participate in surveys on current PC issues, to ask questions about an article, to talk back to the magazine's writers and editors, and to communicate with thousands of our readers. PC Magazine has become a two-way street, a forum rather than a pulpit.

THE COMPUERVE CONNECTION
PC MagNet's structure is diagrammed in the sidebar "A Guide to PC MagNet." It will be familiar to anyone who's spent time on CompuServe, since it's run through the same dial-in network, which has access phone numbers in nearly every area code in the U.S. and Canada. See the sidebar "Connecting to PC MagNet" for a list of telephone numbers. If you haven't yet signed up, the sidebar "How to Join PC MagNet" will show you how.

You can either call into PC MagNet directly or, if you're already logged onto CompuServe, you can switch over to PC MagNet at any prompt simply by typing

GO PCMAGNET. When you do, CompuServe passes you over to the PC MagNet VAX that manages our separate operation within the overall CompuServe structure. Our part of the system can accept up to 400

PRODUCTIVITY INDEX

PC LAB NOTES

An explanation of PC Magazine's on-line service, PC MagNet.

UTILITIES

LASERLIST, a utility that puts two full text pages on a single sheet.

ENVIRONMENTS

Add your own moving logic to the TIMELINE program.

POWER PROGRAMMING

The kinds of indexed files and file index structures are explored.

SPREADSHEET CLINIC

Calculate time in SuperCalc; Excel modifies certain value entries.

USER-TO-USER

Build a hard disk menu system; track bootups with a DOS bug.

POWER USER

Create your own pop-up menus with WordPerfect 5.0's macro commands.

LANGUAGES

Turbo Pascal's word-align function; a fast way to search text in BASIC.

PC TUTOR

Examine large files with DEBUG; interpreting PCMAP's output.

CONNECTIVITY CLINIC

Combine operating systems easily; replace a minicomputer with a LAN.

callers at a time. CompuServe bills callers by the minute, at a rate of \$12.50 an hour.

PC MagNet adds several elements to the basic CompuServe SIG (Special Interest Group) structure. To make it easy for callers to dial in and quickly find and download any of our more than 1,000 files, we've set up a Utilities Database. It includes a search engine to help you find files by name, type, issue number, or the department where they appeared in the magazine. You can then download them using XMODEM or one of CompuServe's two error-checking protocols. (For more information on these, see the sidebar "Choosing a Download Protocol.")

A STOREHOUSE OF PROGRAMS If you've only recently discovered PC Magazine utilities, you may be surprised at the programs published in years past. The Utilities Database covers programs published as far back as early 1985.

But there's a lot more available for downloading than the utilities we publish in each issue. There are the benchmark programs used in preparing our reviews; there are the batch files and short programs from User-to-User, PC Tutor, Power Programming, and all of the other Productivity columns; there are shareware and public-domain programs that we've reviewed; and there are indexes, in either dBASE, ASCII, or comma-delimited form, that list every product reviewed in the magazine, year by year, since 1985.

Since that's a lot to wade through and the essence of intelligent CompuServe use is to minimize on-line time, we've also in-

■ PC LAB NOTES



How to Join PC MagNet



Figure 1: This diagram illustrates the process of joining PC MagNet. It shows you the choices you may make and the information you will have to provide. During the process, whenever you see a colon (:)

you are expected to make a choice. Whenever the diagram says Enter, you should type in the information and then press the Enter key. You may stop the process at any time by typing EXIT at any prompt.

cluded a Utilities Index that you can download and search through off-line. To save still more on connect charges, many of the files are stored in an archived (ARCed) format that cuts file size by anywhere from 10 to 30 percent, depending on the type of file. PC MagNet files that carry the .ARC extension must, of course, be unpacked before they can be used. For this, you'll need the program PK361.EXE. The PK stands for the programmer, Phil Katz, and the number reflects the current version; don't be concerned if the PK file posted has a higher number when you get ready to download it. The unpacking utility is stored in the Shareware section of the Utilities Database. Once you've downloaded it and extracted the files by typing PK361, un-ARC files by entering

PKUNPAK filename

THE PERSONAL TOUCH As I indicated, however, PC MagNet is far more than a clearing house for programs and article indexes. It was designed to bring *PC Magazine's* readers and editors closer together.

Much of the magazine's success has stemmed from the editors' careful attention to comments from readers. When tips submitted to User-to-User reflected a growing interest in LANs, Connectivity Clinic was born. If many readers ask ques-

■ **PC MagNet isn't just a clearing house for programs. It brings *PC Magazine* readers and editors closer together.**

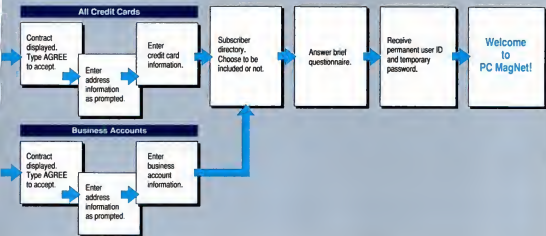
tions about using a particular kind of software or hardware, we create a PC Lab Notes that delves into the topic. And when readers respond favorably to any kind of product coverage, we start to plan more.

PC MagNet accelerates this process. It cuts out the middlemen of hard copy and

postage. Indeed, a large proportion of the Letters to *PC Magazine* we publish have been received via PC MagNet.

Beyond mere comment, however, readers are taking advantage of our forums to engage editors and writers in dialogue. If John Dvorak should happen to rub a reader the wrong way, Dvorak will be up on MagNet in the Editorial Forum to take the abuse and elaborate on his point. Will Zachmann often conducts public surveys to get a feel for what people are interested in hearing about before he writes his column. And all of the discussion is posted for everyone to see.

Responding to questions, Bill Machrone and other editors have spelled out the reasoning behind our coverage of particular stories. Sometimes, a caller merely wants to clear up a point he found confusing. Or, a number of readers may feel a product has gotten a raw deal. In every case, the issue gets a public airing, with every caller free to contribute his own view. But, when it seems more appropriate, private messages can be posted as well.



The Editorial Forum has evolved into a freewheeling, no-holds-barred session that often goes far beyond topics raised in the magazine. There's even a public tavern of the airwaves here, called The Spike!, for hopelessly irreverent conversations.

Our other forums, Tips and Techniques, Utilforum, and Programming, stick more closely to business. Callers raise dozens of questions in these forums every day. If a question has a simple answer, you're likely to get it rather quickly. But you're also likely to get additional advice that addresses your problem in ways you never considered. If there's an incompatibility between the latest utility and some popular program, the solution will be posted in Utilforum as soon as someone discovers it.

FINDING YOUR WAY AROUND To get the most out of the forums, you'll need to learn a few navigation commands. The accompanying sidebar "Navigating PC MagNet" explains some of the basics. When you join PC MagNet, a packet of detailed manuals is mailed to you within a

few weeks. As many of us have found, the easiest way to stay on top of the forum discussions is to acquire and use a copy of *Tapcis*, a shareware program that automates message retrieval and posting. *Tapcis* is available in the Utilities Database un-

■ **The Editorial Forum**
has evolved into a no-holds-barred session that often goes beyond topics raised in the magazine.

der Shareware.

To make sense out of the hundreds of messages that get posted in each forum, PC MagNet categorizes them in two ways. The first is by section, which always reflects a particular department in *PC Magazine*. The Editorial Forum has the largest

number of sections, covering First Looks, Features, After Hours, and the individual columnists.

Within sections, messages are broken down into various "threads," or subjects. Any caller who composes a new message has two choices: a subject and a recipient. An illustration will help clarify the point.

A typical thread might begin with a reader asking Bill Machrone what impact Intel's 486 chip will have on PC owners. When prompted by PC MagNet for a subject, the questioner might enter something like "Whither the 486?" His question, with this thread title, would then be posted in the Viewpoints-Machrone section in the Editorial Forum. Within a day or two, Bill Machrone would answer, but in the meantime so might many other PC MagNet members, *PC Magazine* editors, and PC industry professionals. Everyone can get into the act, responding either to the original message or to a subsequent response.

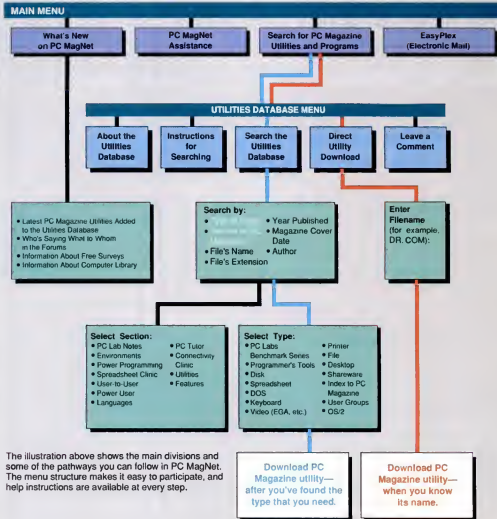
When you come on-line you can see the subject of the thread and the number of responses it has generated in the forum's message directory. You can access this di-

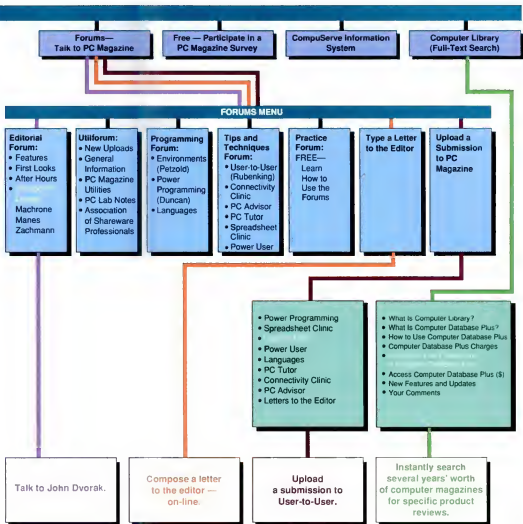
■ PC LAB NOTES



A Guide to PC MagNet

Where to find PC Magazine utilities, data files, and discussion forums







Announcing a big leap in mouse technology.

*Finally, a mouse with an extraordinary body
and a mind to match.*

*A mouse
ballistically
tuned to accel-
erate your cursor
any screen with the mere flick
of a wrist, and slow it down on
arrival for pixel-point control on
detail work.*

*This mouse is guaranteed to work with all
applications on your IBM personal computer.
And it comes with a great selection of
MouseWare™ including Pop-Up DOS™—the
ultimate DOS handler; Mouse-2-3™; the Lotus
1-2-3™ shell; and 35 menus for best-selling
keyboard-based applications.*

*The Logitech Mouse. \$139, complete with
Logitech's Lifetime Satisfaction Guarantee
and unlimited Product Support.*

For your nearest dealer, call:

800-231-7717

*In California:
800-552-8885*

*In Europe:
++ 41-21-869-96-56*



■ PC LAB NOTES



Connecting to PC MagNet

Here, sorted by area code, is a partial directory of PC MagNet's local access numbers for 300- and 1,200-bit-per-second modems. Any of these numbers will connect you to the CompuServe network. Set your modem for 7 data bits, even parity, 1 stop bit, and full duplex.

If you don't find a number in your dialing exchange here, or if you want to find a number that supports 2,400-bps operation, start by using the number for the exchange nearest you. Then, once connected to PC MagNet, type GO PHONES to see a complete listing.

PC MagNet can be accessed through alternative communication numbers including Teletel, TYMNET, DataPac, Computer Sciences Corp., and LATA Networks. All networks charge a usage premium (CompuServe is \$.30 per hour), and remote and local access numbers for alternative networks are available on-line.

—Christopher Barr

CITY	ST	AC	NUMBER
Pasparip	NJ	(201)	287-0085
Hackensack	NJ	(201)	386-8300
Ridgewood	NJ	(201)	444-3613
Jersey City	NJ	(201)	424-8555
Wayne	NJ	(201)	633-5030
Montclair	NJ	(201)	783-5400
Washington	DC	(202)	388-4280
Fairfield	CT	(203)	222-1748
New Haven	CT	(203)	487-3489
New Haven	CT	(203)	487-3489
Hartford	CT	(203)	728-0633
Danbury	CT	(203)	797-1815
Bridgewater	CT	(203)	926-0001
Montgomery	AL	(205)	282-0101
Mobile	AL	(205)	478-0688
Tuscaloosa	AL	(205)	553-1120
Birmingham	AL	(205)	879-2250
Seattle	WA	(206)	241-9111
Everett	WA	(206)	252-4414
Olympia	WA	(206)	786-6666
Tacoma	WA	(206)	922-1790
Portland	ME	(207)	879-0005
Rosette	CT	(203)	222-9452
Boise	ID	(208)	384-5650
Fresno	CA	(209)	252-1692
Stockton	CA	(209)	485-7251
Modesto	CA	(209)	521-9970
New York	NY	(212)	758-2090
Culver City	CA	(213)	390-9617
Long Beach	CA	(213)	591-8282
Los Angeles	CA	(213)	739-8906
Dallas	TX	(214)	953-1971
New York	NY	(212)	758-2090
Albany	PA	(215)	778-6960
Philadelphia	PA	(215)	977-4950
Canton	OH	(216)	465-2516
Youngstown	OH	(216)	743-4992
Cleveland	OH	(216)	781-5730
Akron	OH	(216)	667-1237
Champaign	IL	(217)	352-0041
Springfield	IL	(217)	789-0944
South Bend	IN	(219)	291-9991
El Wayne	IN	(219)	447-0510
Gary	IN	(219)	960-1333
Annapolis	MD	(301)	266-7330

CITY	ST	AC	NUMBER
Saltisbury	MD	(301)	548-1552
Hyattsville	MD	(301)	559-0003
Baltimore	MD	(301)	832-0100
Newark	DE	(302)	731-2640
Grand Junction	CO	(303)	241-1885
Durango	CO	(303)	259-5880
Denver	CO	(303)	629-5563
Dillon	CO	(303)	686-9991
Steamboat Spg	CO	(303)	879-4900
Aspen	CO	(303)	925-5642
Greenwood Spg	CO	(303)	945-0351
Val	CO	(303)	949-1336
Wheeling	WV	(304)	233-9470
Huntington	WV	(304)	733-4010
Charleston	WV	(304)	768-9700
Miami	FL	(305)	266-2231
Jefferson City	FL	(305)	772-3240
Cheyenne	WY	(307)	637-3027
Jackson	WY	(307)	733-1640
Laramie	WY	(307)	742-9641
Peoria	IL	(309)	685-2543
Bloomington	IL	(309)	827-3343
Chicago	IL	(312)	693-0300
Aurora	IL	(312)	859-1557
Flint	MI	(313)	238-6202
Detroit	MI	(313)	255-9207
Ann Arbor	MI	(313)	334-2900
St. Clemens	MI	(313)	468-0294
Ann Arbor	MI	(313)	663-3934
St. Louis	MO	(314)	241-3102
Columbia	MO	(314)	442-4600
Jefferson City	MO	(314)	325-8170
Syracuse	NY	(315)	458-6018
Wichita	KS	(316)	689-8785
Muncie	IN	(317)	284-3612
Lafayette	IN	(317)	448-1357
Indianapolis	IN	(317)	538-2700
Monroe	LA	(318)	361-0700
Shreveport	LA	(318)	424-5380
Lake Charles	LA	(318)	433-0215
Davenport	IA	(319)	323-7388
Grider Rapids	IA	(319)	355-3383
Providence	RI	(401)	438-3000
Lincoln	NE	(402)	474-1006
Omaha	NE	(402)	595-5286
Atlanta	GA	(404)	266-7014
Athens	GA	(404)	549-0888
Columbus	GA	(404)	596-2700
Augusta	GA	(404)	736-8750
Oklahoma City	OK	(405)	948-4860
Billings	MT	(406)	245-0863
Helena	MT	(406)	449-3880
West Palm Beach	FL	(407)	684-9051
Metairie	LA	(504)	734-0857
Vero Beach	FL	(407)	778-0550
Orlando	FL	(407)	896-4298
Murphy	CA	(408)	373-9931
San Jose	CA	(408)	476-0422
San Jose	CA	(408)	968-8762
Galveston	TX	(409)	763-5125
Butler	PA	(412)	268-0187
Pittsburgh	PA	(412)	391-9816
Athens	GA	(413)	548-7431
Springfield	MA	(413)	734-7362
Milwaukee	WI	(414)	258-5818
Green Bay	WI	(414)	494-0917
Livermore	CA	(415)	434-0202
Oakland	CA	(415)	531-1820
San Mateo	CA	(415)	591-5591
Walnut Creek	CA	(415)	862-2533
San Francisco	CA	(415)	956-4181
San Francisco	CA	(415)	362-2523
Little Rock	AR	(501)	224-9311
Louisville	KY	(502)	581-9526
Owensboro	KY	(502)	683-0777
Portland	OR	(503)	328-0912
Portland	OR	(503)	362-2523
Eugene	OR	(503)	689-5800
Baton Rouge	LA	(504)	273-0184

CITY	ST	AC	NUMBER
New Orleans	LA	(504)	734-8150
Abbeville	MS	(601)	265-1283
Log Alston	NM	(505)	862-4122
Medfield	MA	(508)	359-7603
Westborough	MA	(508)	366-2617
Concord	MA	(508)	371-0354
Hudson	MA	(508)	568-5019
Brookline	MA	(508)	568-3222
Billerica	MA	(508)	667-4266
Lawrence	MA	(508)	667-0374
Worcester	MA	(508)	792-0251
Franklin	MA	(508)	875-3814
Spokane	WA	(509)	328-0515
San Antonio	TX	(512)	433-3883
Austin	TX	(512)	444-7234
Laredo	TX	(512)	722-8000
Corpus Christi	TX	(512)	862-1465
Dayton	OH	(613)	461-1064
Cincinnati	OH	(513)	771-1800
Des Moines	IA	(515)	270-9410
Wileston Park	NY	(516)	294-1482
Hoboken	NY	(516)	332-1070
Lake Grove	NY	(516)	461-2880
Lansing	MI	(517)	487-2140
Saginaw	MI	(517)	893-1161
Albany	NY	(518)	439-7481
Jackson	NY	(518)	948-5411
Phoenix	AZ	(602)	256-2951
Santa Vista	AZ	(602)	459-6390
Tucson	AZ	(602)	748-2009
Yuma	AZ	(602)	762-7181
Nashua	NH	(603)	882-5851
Rapid City	SD	(605)	341-3733
Lacrosse	WI	(608)	259-3446
Ithaca	NY	(607)	257-1111
Binghamton	NY	(607)	724-1175
Madison	WI	(608)	256-6508
La Crosse	WI	(608)	785-7530
Atlantic City	NJ	(609)	645-7530
Princeton	NJ	(609)	665-7555
Minneapolis	MN	(612)	342-2207
Cambridge	OH	(614)	437-7360
Columbus	OH	(614)	459-2105
Granville	OH	(614)	587-0932
Athens	OH	(614)	592-0129
Nashville	TN	(615)	266-1947
Galveston	TX	(615)	438-2001
Oak Ridge	TN	(615)	483-2292
Knoxville	TN	(615)	522-0114
Chattanooga	TN	(615)	677-5804
Kalamazoo	MI	(616)	363-1247
Grand Rapids	MI	(616)	557-3366
Mendon	MA	(617)	478-0563
Boston	MA	(617)	868-0024
San Diego	CA	(619)	683-6091
Palm Springs	CA	(619)	325-4484
San Marcos	CA	(619)	471-0960
Solana Beach	CA	(619)	481-3522
San Diego	CA	(619)	599-6067
Encinitas	CA	(619)	753-2728
Reno	NV	(702)	332-4428
Las Vegas	NV	(702)	737-8833
Fairfax	VA	(703)	352-7500
Manassas	VA	(703)	368-5077
Romney	VA	(703)	555-8421
Alexandria	VA	(703)	841-9634
Asheville	NC	(704)	274-3991
Charlotte	NC	(704)	333-6654
Napa	CA	(707)	257-7710
Santa Rosa	CA	(707)	578-1490
Houston	TX	(713)	462-0002
Riverside	CA	(714)	359-7801
Anheim	CA	(714)	520-9724
Newport Beach	CA	(714)	774-0778
Irving	TX	(714)	997-0000
Pomona	CA	(714)	865-2227
San Bernardino	CA	(714)	861-1553
Niagara Falls	NY	(716)	284-3070

CITY	ST	AC	NUMBER
Rochester	NY	(716)	458-3460
Buffalo	NY	(716)	874-2101
Limestone	NY	(716)	925-7042
Hamburg	PA	(717)	657-9633
York	PA	(717)	845-7631
Pueblo	CO	(719)	548-1891
Colorado Springs	CO	(719)	596-0818
Pismo	UT	(801)	371-1280
Salt Lake City	UT	(801)	521-2190
Manchester Ctr	VT	(802)	362-5580
Burlington	VT	(802)	860-1575
Norfolk	VA	(804)	461-4128
Greenville	SC	(803)	255-4686
Charleston	SC	(803)	733-0090
Columbia	SC	(803)	733-5484
Hilton Head	SC	(803)	785-4070
Richmond	VA	(804)	461-6187
Hampton	VA	(804)	741-0158
Charlottesville	VA	(804)	886-0555
Sarasota	FL	(813)	979-5159
Ocala	FL	(813)	323-7703
Orlando	FL	(813)	486-3360
Thousand Oaks	CA	(805)	499-0371
San Luis Obispo	CA	(805)	549-9605
Ventura	CA	(805)	643-0177
Santa Barbara	CA	(805)	682-5231
Lancaster	CA	(805)	942-3688
Amario	TX	(806)	379-8411
Lubbock	TX	(806)	783-5081
Kailua	HI	(809)	263-5670
Honolulu	HI	(809)	671-3210
San Juan	PR	(809)	726-3012
Evansville	IN	(812)	479-0165
Tampa	FL	(813)	237-8188
Winter Haven	FL	(813)	299-3311
Sarasota	FL	(813)	355-8331
St. Petersburg	FL	(813)	525-0378
St. Myers	FL	(813)	939-7060
Somerset	PA	(814)	443-6402
Erie	PA	(814)	864-4018
Rochford	IL	(815)	968-3412
Kansas City	MO	(816)	474-3770
Fort Worth	TX	(817)	283-0041
Sierra Madre	CA	(818)	357-0971
N Hollywood	CA	(818)	733-0558
White Plains	NY	(818)	922-0632
Memphis	TN	(901)	452-1710
Daytona Beach	FL	(904)	257-5019
Tallahassee	FL	(904)	385-0590
Jacksonville	FL	(904)	396-7105
Pensacola	FL	(904)	434-3811
Panama City	FL	(904)	971-0660
Fairbanks	AK	(907)	479-4102
Anchorage	AK	(907)	563-8425
Savannah	GA	(912)	356-0222
Albany	GA	(912)	435-8420
Macon	GA	(912)	471-0147
Topeka	KS	(913)	234-1051
Midtown	NY	(914)	344-3800
Poughkeepsie	NY	(914)	473-2617
White Plains	NY	(914)	771-9060
El Paso	TX	(915)	565-4661
Midland	TX	(915)	697-8211
Abilene	TX	(915)	696-1111
San Lake Tahoe	CA	(916)	541-8940
Sacramento	CA	(916)	371-4681
Tulsa	OK	(918)	749-8601
Greensboro	NC	(919)	373-1535
Wilmington	NC	(919)	382-4700
Burlington	NC	(919)	584-3762
Meriden	CT	(919)	725-1550
Raleigh	NC	(919)	876-9009

Canada	ST	AC	NUMBER
Edmonton	AB	(403)	466-4501
Calgary	AB	(403)	264-9300
Montreal	QC	(514)	371-4681
Vancouver	BC	(604)	736-5157
Ottawa	ON	(613)	837-5427

DO THE TWIST!

Introducing Artline.
The Graphics Illustrator That Manipulates Type Down To The Letter.



Twist it! Turn it! Anyway you want it. With Artline, you can produce high-quality text effects and original graphics you never thought possible. All on your PC!

Choose a typeface, draw free-hand, trace an image. Then take your graphic design even further. Scale it, rotate it, color it, pattern it, mirror it, copy it...well, you get the picture.

You can partner Artline with GEM[®]

Desktop Publisher[®], Xerox[®] Ventura Publisher[®] and Aldus[®] PageMaker[®] for logos, headlines and illustrations. And it'll work with almost any printer.

Artline. The ideal design tool for the most innovative, high-quality text and graphics. It's revolutionary. In every sense of the word.

For more information, contact your nearest dealer or call (800) 443-4200.

All artwork shown was created using Artline.

GEM Artline *by GCP*

From  DIGITAL RESEARCH[®]



GEM, Digital Research and the Digital Research logo are registered trademarks and GEM Artline and GEM Desktop Publisher are trademarks of Digital Research Inc. Other product names are registered trademarks of their respective owners. Copyright © 1988, Digital Research Inc. All rights reserved.

CIRCLE 743 ON READER SERVICE CARD

CMO... Your Nationwide Source

Sharpen Your Image With This Combination!



Seiko CM1430 Color Monitor

Knowledgeable PC users everywhere are stating a preference for the Seiko Instruments CM-1430. They

already know of its superior dot pitch to the IBM 8514, sharper focus and edge clarity than the Zenith ZCM-1490, and its greater upward compatibility than the NEC Multisync II

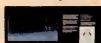
Retail \$895

Orchid ProDesigner VGA Adapter

The ProDesigner VGA is the most powerful, expandable yet affordable video card in the series ProDesigner supports both the 8 and 16 bit bus, ensuring maximum performance from your system. The VGA card brings your graphics to life with amazing speed.

Retail \$495

Get Both At
CMO'S Package Price: **\$899**



MONITORS

Amdisk

Video 210 Monochrome Amber \$ 88
Video 410 TTL Monochrome 145
Video 432 PS/2 Monochrome 169
Color 632 14" VGA 640X480 359
Color 732 PS/2 VGA 419
Monitor 1280 15" 1280X800 639

Cornerstone

SinglePage Display 899

Magnavox

7BM623 12" TTL Amber 79
7CM8515 14" Comp./RGB 279
7BM749 14" Flatsquare VGA 149
CM8762 14" Comp./RGB 249
9CM053 14" HiRes EGA 369
9CM062 14" VGA Color 349
NEC
JC-1402 Multisync 589



NEC
Multisync IIA
1499

Packard Bell

PB-1272 12" TTL Mono \$ 79
PB-1472 14" TTL 132 Col. 109
PB-1422EG 14" HiRes EGA 359

PB-8526M5 14" Uniscan	\$ 449
Polaroid	
Palette EGA Plus	2299
Princenton Graphics	
UltraSync 12" VGA	479
Seiko Instruments	
CM-1430 14" VGA	639
Taxan	
770+ Multi-Vision 14" RGB	499
Wyse Terminals	
WY-30, 50, 60	Call
Zenith	
ZFM-1490 14" VGA Analog	579

MULTIFUNCTION CARDS

ATD-ZackerBoard	
Color Half Card	79
Monochrome Graphics Adapt.	79
576K Half Card Memory	50
AT-Primary Memory Board	99
AST	
Six Pak Plus Board	119
VGA Plus Board	389
Hot Shot 286 Board	349
Rampage/286 512K	399
Boca Research	
TopHat 128K Expansion	129
BocaRam/XT 0-2MB Board	109
BocaRam/AT 0-4MB Board	149
BocaRam/30 0-2MB	119
BocaMCA Serial/Parallel	145
Boca Multi EGA	189
DCA	
Irma 2 327B Board	729
Emerald	
3XTwin Local 5251 Emul.	669
3XMate-4B 5250 w/4800Bd	1349
Everex	
Ram 3000 Dlx. 0-3MB Bd.	89
RAM 8000 Dlx. 0-8MB 16-Bit	289
Micro Enh. Dlx. 800 x 600	179
EVGA 256 Colors 1280x800	279
5th Generation	
Logical Connection 256K	429
Logical Connection 512K	479
Hercules	
InColor Card	199
Graphics Card Plus	169
VGA Card	Call
Network Card Plus	339
Intel	
AboveBoard 2 Plus w/OK	319
AboveBoard PS/286, 512K	419
AboveBoard Plus, 512K	429
AboveBoard Plus I/O 512K	579
Inboard 386/AT 80386 CPU	899
Connection CoProcessor	759
8087 PC/XT CoProcessor	95
8087 2 PC/XT 8MHz CoP.	135
80287-8 IBM XT 8MHz CoP.	219
80387-16 16MHz 80386	399
Orchid Technology	
TinyTurbo 286	285
RamQuest II Board	545
Paradise	
AutoSwitch EGA 480	Call

Video 7

FastWrite Video Adapter	\$349
Vega Deluxe Adapter	209
Vega VGA Adapter	279



STORAGE DEVICES

Everex

Floppy Stream 40 40MB Int.	359
Excel Stream 40T 40MB Int.	529
Excel Stream 60 60MB Ext.	979

Imagem

Bernoulli Box II Int.	789
-----------------------	-----

Maynard

Maynstream 60MB PS/2 Ext.	Call
---------------------------	------

Miniscribe

B425 20MB 3 1/4" 40Msec	259
3650 40MB 5 1/4" 61Msec	349
3053 44MB 5 1/4" 25Msec	499
6085 70MB 5 1/4" 28Msec	599

Mountain Computer

TD-4000 40MB Int. Tape	369
TD-8000 80MB Int. Tape (New)	445

PC-T00

TD-4000 40MB TapeBackup	339
-------------------------	-----

Plus Development

20MB HardCard	539
40MB HardCard	689
20MB/40MB Passport	Call

Seagate

ST-225 20MB w/cont	249
ST-238 30MB w/cont	289
ST-251 40MB 1/2 Height	349
ST-4096 80MB Full Height	579

Sony

3 1/4" 720K Floppy Drive	89
--------------------------	----

Sygen

Bridge-File 5 1/4" External	249
Bridge-Tape 40MB TapeBackup	499
Omni Board Controller	79

SmartImage 60MB Internal

QIC-File 60MB External	599
------------------------	-----

DuraPak 15MB Removable

Wetec Laptop Subsystems	979
-------------------------	-----

Epson 360K Ext. Floppy	199
------------------------	-----

NEC 1.2MB Ext. Floppy	199
-----------------------	-----

Zenith 360K Ext. Floppy	199
-------------------------	-----

Your Source for Hardware, Software & Peripherals

For Quality Computer Products.

ASK OUR SALES CONSULTANTS TO HELP YOU CHOOSE FROM OVER 4,000 PRODUCTS.

COMPUTERS

AMSTRAD	
PPC-640 Portable	5849
AST	
Premium 286 Model 80	1459
Premium Workstations	Call
Compaq	
Desktops and Portables	Call
NEC	
MultiSpeed HD 20M8	2299
ProSpeed 286 16MHz 80286	New
UltraLine Laptop 9.83 MHz	New
PC-TOO	
640K 8MHz 8088 Dsktp.	589
512K 8MHz 80286 Dsktp.	799
512 12MHz 80286 Dsktp.	899
20MHz 80386 Dsktp.	2699
Sysgen	
ProSystem 12MHz w/40M8	1999
Toshiba	
T1000 8088 Laptop	789
T1200 Floppy/HD Laptops	Call
T1600 12MHz 80C286 20MB	Call
Wyse	
80286/386 Desktops	Call
Zenith	
80286/386 Desktops	Call
SuperSport Lptps. w/Mod.	1999

COMMUNICATIONS

Anchor	
2400 Baud Internal	49
2400 Baud External	139
2400 Baud External	169



INTEL
PS/2 2400B Internal
\$39

ATD-Zuckerboard	
1200 Baud Internal	60
2400 Baud External	129
Everex	
Evercom 12 1200 Baud Int.	80
Evercom 24+ 2400 Int	149
Evercom 24E+ 2400 Ext	199
Hayes	
SmartModem 1200 Baud	269
SmartModem 2400 Baud	425
Intel	
2400B Classic Internal	249
Murata	
MT200 Facsimile	749
Packard Bell	
2400 Baud Internal	149
PBFAK 100 Group III	Call
Panasonic	
FX-89 Fax Board	699
FX-505 Hi-Res Scanner	1049
Practical Peripherals	
1200 Baud Internal	65

1200 Baud Stand Alone	\$109
2400 Baud Stand Alone	189
Sharp	
FO-220 Facsimile Machine	999
FO-420 Facsimile Machine	1299
U.S. Robotics	
1200 Baud Direct Int	79
1200 Baud Direct Ext	99
2400 Baud Direct Ext	179

PRINTERS

Alps	
ASP-1000 9-Pin Flatbed	189
Allegro 24 24-Pin Flatbed	349



EPSON
LQ-950 24-PCPS
\$369

Brother	
M-1709 240cps, 132 Col.	369
HR-20 20cps Daisywheel	329
HR-40 40cps Daisywheel	589
Epson	
EX-800 300cps, 80 Col.	369
FX-850 264cps, 80 Col.	Call
FX-1050 264cps, 132 Col.	Call
LX-800 180cps, 80 Col.	169
LQ-500 180cps, 24-Wire	299
Call For LQ Rebates!	
LQ-850 330cps, 24-Wire	Call
LQ-950 264cps, 24-Wire	Call
LQ-1050 330cps, 132 Col.	Call
LQ-2550 500cps, 24-Wire	Call
Hewlett Packard	
Thinkjet 2225	329
NEC	
P2200 Pinwriter 24-Wire	359
P5200 Pinwriter 26cps	519
PC-890 PostScript Laser	3295
Okidata	
ML-182+ 180cps, 80 Col.	249
ML-320 300cps, 80 Col.	359
ML-390 270cps, 24-Wire	499
ML-393 450cps, 132 Col.	989
Panasonic	
KX-P1180 192cps, 80 Col.	189
KX-P1191 280cps, 80 Col.	259
KX-P1124 192cps, 24-Wire	339
KX-P1592 180cps, 132 Col.	389
KX-P1524 24-Wire, 132 Col.	579
KP-P4450 Laser	Call
Seikoshia	
SP1600AI 160cps, 9-Pin	185
SK1000AI 300cps, Color (opt.)	365
Sar Micronics	
NX-1000 140cps, 80 Col.	169
NX-1000 7-Color, 80 Col.	239

SOFTWARE

Aldus	
Aldus PageMaker Ver 3.0	469

Ashdon-Tate	
dBase IV	\$459
MultiMate Advantage II	289
Borland	
Paradox R-Database	439
Quattro	149
Breakthrough	
Project Manager 3.0	355
Central Point	
PC Tools Deluxe	50
PC-11 Option Board	129
DAC Software	
DAC-Easy Accounting	60
5th Generation	
FastBack Plus	98
Fox Software	
FontBase+ Development	199
Fank Software	
Allways	90
Sideways	40
IMS	
OptiMouse w/Dr. Halo III	80
Imai	
Quicken	33
Logitech	
C7 Mouse w/Software	80
ScanMan Scanner	189
Lotus Development	
Lotus 1-2-3	289
Lotus Agenda	289
MECA	
Managing Your Money	119
Meridian Technology	
CarbonCopy Plus 3.0	119
Microware	
R-Base for Dos 2.11	439
Mossoft	
Serial or Buss Mouse	109
Windows 286 Ver 2.1	70
Nantucket	
Clipper (Summer 87)	419
Peter Norton	
Norton Commander	40
Advanced Utilities	80



MMC
OmniMouse
\$39

PaperBack	
VP-Planner Plus 2.0	\$119
Peachtree	
Complete Accounting	169
Quarterdeck	
DESQView 2.02	80
Server Technology	
EasyLan Starter Kit	179
Software Publishing	
1st Choice 3.0	90
1st Publisher 2.0	80
1st Graphics	89
The Complete PC	
Handson For PC	179
Complete Answer Machine	259
The Software Group	
Enable Version 2.0	399
Traveling Software	
Lap-Link Plus	85
WordPerfect Corp.	
WordPerfect 5.0	219
Xerox	
Venura Publishing 2.0	445



Your Source for Hardware, Software & Peripherals

In U.S.A.

800-233-8950

In Canada call: 800-233-8949

All Other Areas call: 717-327-9375 Fax call: 717-327-1217

Educational, Governmental and Corporate Organizations

Call toll-free: 1-800-221-4283

CMO, 101 Reigard Ave., Dept. B1, Williamsport, PA 17701

Over 600,000 SATISFIED CUSTOMERS • MAJOR CREDIT CARDS ACCEPTED

POLICY: Add 3% (minimum \$7.00) shipping and handling. Large shipments may require additional charges. Personal and company checks require 3 weeks to clear. For faster delivery, use your credit card or send cashier's check or bank money order. Credit cards are not charged until we ship. Pennsylvania and Maryland residents add appropriate sales tax. All prices are U.S.A. prices and are subject to change. All items are subject to availability. Defective software will be replaced with the same item only. Hardware will be replaced or repaired at our discretion within the terms and limits of the manufacturer's warranty. We cannot guarantee compatibility. All sales are final and returned shipments are subject to a restocking fee. We are not responsible for typographic or photographic errors.



■ PC LAB NOTES

CHOOSING A DOWNLOAD PROTOCOL

A protocol is used to ensure that the file you download is received without errors. PC MagNet currently supports a number of file transfer protocols, including Xmodem (MODEM7), CompuServe "B", CompuServe "A", DC4/DC2 CAPTURE, Kermit, and CompuServe Quick-B. Selecting which one of these to use is often dictated by what's available within your own communications software.

The two most commonly used protocols are Xmodem, a checksum-based protocol that is included in almost any PC-based communications program, and CompuServe Quick-B, a more advanced protocol that is specifically designed to optimize file transfer between PCs and the CompuServe network used by PC

MagNet. If your software package supports it, we strongly recommend that you select Quick-B, as this minimizes the connect time needed to transfer the desired file(s).

To download a file from PC MagNet from within a forum library, enter the browse command, BRO, at the "Enter choice!" prompt. Browse is an easy way to view descriptions of the files available for downloading. If you already know the name of the file, you can specify it as part of the browse command, as, for example

BRO AT.ARC

PC MagNet will display a description of the first available file. To download the file, enter DOW, or just D. PC Mag-

Net will then present a menu of the available file transfer protocols. Choose the CompuServe Quick-B protocol if your software supports it. If not, choose a protocol that your software does support, such as Xmodem or Kermit.

Depending on your protocol choice, you may be asked to enter a filename for your computer. You can enter a complete file specification, including a drive letter and a path to the directory in which you want to store the received file. If you are asked to "initiate the transfer," you may have to instruct your software to start the actual transfer. If you're using the Xmodem protocol, for example, simply enter whatever commands your software requires to receive a file via Xmodem protocol.—Salvatore P. Ricciardi

rectory either by picking Select from the Read menu or by issuing the Browse command at a prompt. Don't be shy about leaving messages! If you have second thoughts, you can delete any message you posted (although you can't delete anyone else's—except those addressed to you).

Each forum has its own flavor. Here's a taste of each from some of the *PC Magazine* contributors who haunt them.—Gus Venditto

EDITORIAL FORUM One of the most fascinating forums is the Viewpoints-Dvorak Forum, where I have handpicked the smartest and most brilliant technical types in the world to scrutinize and discuss every aspect of every idea imaginable. These guys stun me every time I log on—and I try to log on once or twice a day. So if you have something profound to say or if you have a question of interest to the computing community, then check out the Dvorak section of the Editorial Forum. It's fantastic. Just log in and join in the fun. You'll know whether OS/2 will ever be a hit before the numbers are even posted.

All I can say for my group is that it proves that a columnist is only as good as his readers. I'm sure not smarter than any of these guys. Well, maybe one or two of them (but I'm not telling!). Also look for

this section to find the most controversial discussions. If you like to be in the middle of a good fight, then check it out!—John C. Dvorak

Computers have fascinated me since I started reading science fiction in the early 1950s. I got my first computer kit in 1956 or '57. It was called a GENIAC, cost \$19.95, and its biggest achievement was the ability to add two three-digit binary

■ If you like a good fight, check out the Viewpoints Forum—and Dvorak.

numbers to show a four-digit binary sum. From my first experiences with SOAP on an IBM 650 and FORTRAN on 7094s, through COBOL, assembly language, and PL/I on IBM 360s and 370s, right up to Pascal, C, Prolog, LISP, Forth, and C++ on personal computers, I've never lost that early fascination.

Even more fascinating for me is watching the industry and where it's going. That's really what I aim to do in my column and my section on PC MagNet. I see the latter as a forum to discuss the critical battles of the day: OS/2 vs. Unix; MCA vs. EISA; the battle to define the user interface of the future; the spreadsheet, word processing, database, and networking wars; and, most of all, the successful guerrilla battle of microprocessor-based systems against the proprietary mainframe and minicomputer dinosaurs. So why don't you join me in Section 10 of Editorial Forum to share and exchange views and ideas on these strategically vital issues.—William F. Zachmann

Confused about the current state of the computer arena? Annoyed about your inability to make sense of it? Enraged that it should all be so perplexing? Me, too. So I won't promise to solve your thorniest problems or tell you how to install a dual-ported carburetor on your Clown 386XS. But I do promise to give the important issues a thorough airing (not to mention a good thrashing when necessary), offer plenty of sympathy and commiseration, and keep my mouth shut and my fingers clenched when I don't have the foggiest

HARD BARGAINS



THE
AFFORDABLE
FORTY

Now Seagate brings mass storage within the reach of even more people. Our new 21 megabyte ST225R and 42 megabyte ST250R represent a significant price breakthrough for half-height drives.


But low cost isn't the only benefit. The performance characteristics of these drives make them

well-suited for single-user PC applications. They're faster, easier and less expensive than tape or floppies as backup devices for your existing hard drives. And with an MTBF of 35,000 hours, they feature the same high reliability that's made Seagate the first name in disc drives worldwide.

You can save not only money but time by pairing either of these drives with Seagate's own ST11R controller. With installation software preloaded on the drive, system set-up is fast and easy.

To find out more about high-quality storage solutions at surprisingly affordable prices, contact your authorized Seagate dealer. Or call Seagate at 800-468-DISC, or 408-438-6550.

THE
ATTAINABLE
TWENTY

 **Seagate**

The first name in disc drives

Count

CompuAdd backs systems and service with some pretty impressive numbers.

Fifty service centers and 230 offices worldwide.

CompuAdd offers optional on-site service contracts from the industry leader—Memorex Telex Corporation. A service technician is in your office within 48 hours. You choose the level of support that's right for your company.

Forty-eight-hour product exchange program.

We solve problems immediately with our toll-free customer support line and, when required, we'll send you a new exchange part by Federal Express*. Within two days. And we pay the freight. Both ways.

Thirty-day money-back guarantee.

We mean it. Return any hardware purchase to CompuAdd within 30 days for a complete refund. No questions asked. Plus, we back every product with a one-year limited warranty.

Fifteen CompuAdd Superstores in ten cities. And more on the way.

Our growing national chain of Superstores means greater convenience and low prices direct to you. Our stores feature mail order pricing, expert repair service and solutions to data processing problems.

Six times recognized by industry publications for quality product design and manufacturing.

PC Magazine has awarded the prestigious Editor's Choice distinction to four different CompuAdd products. *PC World* conferred their Best Buy award on the CompuAdd Turbo/10. The CompuAdd 386/16 earned *Computer Shopper's* Best Buy designation.

One year of toll-free technical support.

Our experienced technicians speak your language, answering questions on the installation and operation of your new hardware or software.



on CompuAdd.



CompuAdd computers are fully IBM AT, MS-DOS[®]-compatible and are certified SCO[™]—Xenix/Unix-compatible. They incorporate the latest performance enhancements including ROM shadowing, instruction pipelining, and memory expansion capacities up to 5MB or 16MB of RAM.

The CompuAdd 386 Series

CompuAdd 386/25

- 80386-25 processor running at 25MHz or 8MHz software-selectable system speeds
- 0 wait state (cache memory)
- 32-bit high speed RAM board with 1MB RAM (expands to 16MB)
- System and option ROM shadowing
- ROM-based setup
- CompuAdd INTEGRATOR[™] productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Two serial ports and a parallel port built-in
- Six 16-bit and one 8-bit expansion slots
- Math coprocessor support for 80387, Weitek, or both
- Integrated Drive Electronics (IDE) fixed disk drive interface
- Enhanced 101-key keyboard
- 29.4 on Norton's SI Benchmark 4.0 test

\$2895

CompuAdd 386/20

- 80386-20 processor running at 20MHz or 8MHz software-selectable system speeds
- 0 wait state (cache memory)
- 32-bit high speed RAM board with 1MB RAM (expands to 16MB)
- System and option ROM shadowing
- ROM-based setup
- CompuAdd INTEGRATOR[™] productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Two serial ports and a parallel port built-in
- Six 16-bit and one 8-bit expansion slots
- Math coprocessor support for 80387, Weitek, or both
- Integrated Drive Electronics (IDE) fixed disk drive interface
- Enhanced 101-key keyboard
- 23.4 on Norton's SI Benchmark 4.0 test

\$2295

The CompuAdd 286 Series

CompuAdd 286/20

- 80286-20 processor running at 20MHz or 8MHz switchable system speeds
- 0 wait state (four-way interleave)
- 1MB RAM expandable to 5MB
- ROM-based setup
- CompuAdd INTEGRATOR[™] productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Integrated Drive Electronics (IDE) fixed disk drive interface
- Two serial ports and a parallel port built-in
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Enhanced 101-key keyboard
- 20.4 on Norton's SI Benchmark 4.0 test
- (22.5 rating with 2MB memory and four-way interleave)

\$1695

CompuAdd 286/16

- 80286-16 processor running at 16MHz or 8MHz switchable system speeds
- 0 wait state (four-way interleave)
- 1MB RAM expandable to 5MB
- ROM-based setup
- CompuAdd INTEGRATOR[™] productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Integrated Drive Electronics (IDE) fixed disk drive interface
- Two serial ports and a parallel port built-in
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Enhanced 101-key keyboard
- 16.0 on Norton's SI Benchmark 4.0 test
- (18.0 rating with 2MB memory and four-way interleave)

\$1495

386/25 System	MGA	EGA	VGA
40MB, 20ms	\$3,449	\$3,799	\$3,999
80MB, 20ms	\$3,899	\$4,049	\$4,249

386/20 System	MGA	EGA	VGA
40MB, 20ms	\$2,849	\$3,199	\$3,399
80MB, 20ms	\$3,099	\$3,449	\$3,649

286/20 System	MGA	EGA	VGA
40MB, 20ms	\$2,249	\$2,599	\$2,799
80MB, 20ms	\$2,499	\$2,849	\$3,049

286/16 System	MGA	EGA	VGA
40MB, 20ms	\$2,049	\$2,399	\$2,599
80MB, 20ms	\$2,299	\$2,649	\$2,849

Order Toll Free: **800-666-1872**

Customer Service: **800-999-9901** Fax: **512-250-5760**

Telex: 763543 COMPUADD AUS USA: 512-258-5575

CIRCLE 320 ON READER SERVICE CARD

CompuAdd
CORPORATION
12303 Technology Blvd. Austin, Texas 78727

Some Of The Best Networks Are Being Held Together With Tape.



150MB QualityTape™ Backup From Tecmar.

Smart network managers know their network isn't complete until their data is protected by tape backup. And the best security for your network's data is Tecmar's top-of-the-line QT-150 tape backup system. Its 150MB capacity is ideal for holding networks together. The QT series is certified for use with Novell® and other popular networks.

Tecmar's QualityTape systems offer from 40 to 150 MB of data storage in both internal and external models.



*Tecmar's
QT family.*

Leadership.

As the industry leader in tape backup, Tecmar is the choice of more companies, worldwide, than any other tape system—more than half the Fortune 500 have chosen Tecmar.



That's confidence. And, after all, confidence is a big reason

for buying tape backup.

If your network protected? If not, call Tecmar now at (800) 624-8560. Or write Tecmar, Inc., 6225 Cochran Road, Solon, Ohio 44139-3377.

TECMAR

©Copyright Tecmar, Inc., a subsidiary of Broom, Inc., 1988
All rights reserved.
All Tecmar products are trademarks or registered trademarks of Tecmar, Inc. Other brand and product names are trademarks or registered trademarks of their respective companies.

■ PC LAB NOTES

idea about a topic. At times we'll even go off on wild tangents and talk about things only remotely related to computers—such as human beings.—*Stephen Manes*

UTILFORUM You say you're having problems running a *PC Magazine* utility? You can't get SNIPPER to snip? ASPRN makes you want to take a powder? Not to worry—head over to the Utilforum and talk to the folks who actually wrote the programs. The Utilforum's message sections are dedicated to giving *PC Magazine* readers advice on the ins and outs of our programs and routines.

In the forum libraries, you'll find all of *PC Magazine's* utilities. If you're looking for a program from a recent issue, look in Library 0—New Uploads. After 30 days all *PC Magazine* programs are moved to Library 9—Utilities—where they can be easily accessed. We even have a library for shareware. That's Library 8, reserved for programs written by members of the Association of Shareware Professionals.—*Christopher Barr*

PROGRAMMING FORUM Have you ever had a dream in which you find yourself in a strange city, a place where the street signs are in a foreign language, and none of the directions make any sense?

That's almost what it's like when you start programming for OS/2 and the Presentation Manager. Programming has never been easy, and it's not getting any easier. But if you want help, the PC MagNet Programming Forum is the place to find it. I log onto PC MagNet several times a day, and I like to see questions because that means people are working on programs that the rest of us may someday use.

So, whether you've just started with OS/2 or are well along, if you have a question about OS/2 or Presentation Manager programming, just ask. The Programming Forum is quickly gaining a wide reputation as a meeting place for OS/2 programmers, so if I can't answer your questions, there's sure to be someone around who can.—*Charles Petzold*

It's a cold, cruel, confusing world for the programmer these days, with count- less operating systems and programming

languages all competing for your pocket-book and, worse yet, for your valuable time. PC MagNet can help you make sense of it all. If you join us in the Programming Forum, you will be treated to nightly discussions with—and advice from—PC experts, consultants, authors, and gurus of every creed and persuasion. You may find our Programming Forum provocative, you may find it informative, you may find it witty—but there is one thing for certain, you will never find that it is boring.—*Ray Duncan*

TIPS AND TECHNIQUES FORUM

You're a Power User—admit it. Your fellow workers come to you with questions about word processing, spreadsheets, databases, all the programs they use. You keep up to date by reading the Power User column in *PC Magazine*. But when even

you get stumped, just log onto PC MagNet and visit the Tips and Techniques Forum. Between them, our editors have used an amazing percentage of the vast number of applications not only in the areas mentioned above, but in desktop publishing, accounting, telecommunication, and more. And they answer right away. And our readers' experiences cover an even wider range.

PC Magazine's User-to-User column gives you great batch files, patches, and other DOS tips in every issue. But what if one of them just doesn't work on your particular system? Perhaps one of your fellow readers has the exact same system configuration and has found a workaround. Or the editors may already know about your problem and have a solution waiting. Again, the answer is to log onto PC MagNet's Tips and Techniques Forum.

NAVIGATING PC MAGNET

The entire PC MagNet system is menu driven, so it's easy to find your way around, but learning a few commands will help you move even faster. When you've mastered the basic commands, you may wish to turn off the menus and work directly in the command mode. You can do this from the Options menu. Throughout the service, the exclamation point (!) is the most common prompt for a choice or command.

THE GO COMMAND Issued together with a destination, the GO command takes you directly to any forum or other place in PC MagNet. To illustrate, here are some of the useful GO commands:

- GO EDITORIAL (to get to the Editorial Forum)
- GO PHONES (for a list of local access numbers)
- GO PROFILE (to set user options)
- GO INSTRUCTIONS (to access general system information)

GENERAL COMMANDS Here are some of the more-frequently used navigating commands:

Ctrl-S—Suspends or freezes the screen so that you can read it. Then just

hit any key to get started again.

Ctrl-C—Cancels the command being executed. This is useful if you've stumbled into an area in which you're not interested. The command may take a few seconds to work, since a large stream of data is probably on its way to you.

T—Returns you to the TOP level of PC MagNet.

M—Brings you to the top of the section menu; it's useful if you've chosen the wrong command and want to try again.

H (or ?)—Calls context-sensitive help. It's a smart idea to save all of the advice to a text file that you can refer to off-line.

READ—Works in forums only, accesses the hundreds of messages stored, starting with the oldest message you haven't read.

REPLY—For answering the message you've just read.

OP—Brings up your personal options menu. One important option is your high message in a forum. If you want to reread old messages that you've already seen, you change the high message here.

BYE (or OFF)—Signs off and disconnects.—*Gus Venditto*

COUGAR MOUNTAIN

S.O.F.T.W.A.R.E.

ACCOUNTING AT ITS BEST!

MULTI USER Professional Accounting FOR PC-DOS* & MS-DOS*



was designed from inception for multi-user accounting with true record and file locking capabilities. IT HAS BEEN TIME PROVEN since 1982.

WE SUPPORT the following networks: Novell, IBM PC LAN, MultiLink Advanced, LanLink, PC-MOS 386, Network-OS, Vlanet, Grapevine, STARLAN, PC-NOS. Other LANS are continually being added. Call for information.

TO ORDER CALL (800) 344-2540
8:00-5:00 MST — Monday-Friday

Our guarantee is your assurance of quality!

NOT \$5995**
NOT \$1995**
NOT \$4200**

UNCONDITIONAL 30-DAY
MONEY BACK GUARANTEE
Product must be returned in
resalable condition.
Restocking fee applicable.

GUARANTEE applicable on all products
bought directly from COUGAR
MOUNTAIN SOFTWARE.

TRADE-IN OFFER
\$50* trade-in on your single user
accounting software that offers
you DEACEND FOR GROWTH
Send final disks with order

COUGAR MOUNTAIN
S.O.F.T.W.A.R.E.
2609 Kootenai, Box 6666
Boise, ID 83707
208-344-2540

*MS-DOS and XENIX Microsoft
*PC-DOS International Business
Machines

ALL 6 MODULES

ONLY

\$999.50

(Effective March 1, 1989)

+ 11.50 Shipping & Handling

VALUE, FLEXIBILITY, POWER, SECURITY,
PERFORMANCE, INTEGRITY AND PRICE

COMPARE AND SAVE
LOOKUP WINDOWS THROUGHOUT

GENERAL FEATURES

- "LOOKUP" Windows throughout
- Menu driven with 2 help references
- Multi company and report generator
- Sample data files included
- Complete audit trail
- All modules can post to multiple profit centers
- Fully integrated with single source entry
- Date sensitive user-defined fiscal calendar
- User defined financial reports
- User can design checks, invoices, statements and W-2s
- User defined chart of accounts, account numbers and stock numbers up to 15 alphanumeric

GENERAL LEDGER

- Allows for multi-company ledgers
- Unlimited multi-level accounts for departmentalized reporting
- Allows recurring journal entries
- User can process transactions 2 periods into next year
- Allows budgeting

ACCOUNTS RECEIVABLE

- Open invoice and/or balance forward
- Allows unpaid payments
- Prints statements
- Handles recurring accounts receivable
- Supports partial payments and finance charges
- Allows unapplied credit memos
- Up to 5 user-defined aging periods
- Mailing labels and reports with 7 different sorts

INVENTORY

- Supports LIFO, FIFO, weighted averages and standard cost
- Supports markup, margin or list
- Allows up to 4 places to right of decimal for unit cost and price.

SALES INVOICING

- Supports service or product oriented businesses
- User-defined tax tables including multiple sales taxes
- Prints picking slips
- Prints invoices
- Alerts user to customer exceeding credit limit
- Saves history reports
- Automatic updating of inventory daily
- Allows retail credit memos

ACCOUNTS PAYABLE

- Can post up to 200 general ledger expense accounts per invoice
- Prints checks
- Automatically prepares payments
- Supports partial and handwritten checks
- Picks up credit and debit memos
- Compares discounts and records discounts taken

PAYROLL

- Generates automatic payroll
- Provides up to 8 user-defined rates
- Allows post facto payroll
- Allows distribution of payroll expenses to user-defined departments
- Benefits and deductions are calculated on base amounts
- Hourly amounts, percentage of gross or variable
- Allows add-ons to gross which may be taxable, non-taxable or partially taxed
- Handles 401K and 403a
- All tax tables easily updated by the user
- Handles payroll draws, per diem pay, contract and piece work, hourly and salary
- Handles tip accounting
- Prints checks and W-2s

HARDWARE REQUIREMENTS

IBM PC* or compatible HARD DISK REQUIRED.

XENIX* Version Also Available. Call For Information.

CIRCLE 114 ON READER SERVICE CARD

PRODUCTIVITY

■ PC LAB NOTES

And while you're on-line, you should check out the other conversations. You may know the answer to another reader's question and you can earn the reward of satisfaction that comes from helping out. —Neil J. Rubenking

Home of LAN Wizards. One of the regulars on the Connectivity Clinic Forum uses the motto "Networks are My Life" on his business card. That sums up the attitude of many of the people available to answer your questions and help you make the best buying choices when you need to hook one PC to another computer or communica-

■ The Utilities Database is where you'll find every program that's been in *PC Magazine*.

tions service.

Any topic, from the best low-cost LAN for a particular application to alternatives for exchanging data with a mainframe, is fair game on this section of the Tips and Techniques Forum. You don't have to be a LAN guru to participate, but if you want to learn about advanced topics like NetBIOS programming and fiber-optic signaling standards, we can help.

If you need to share a printer, exchange a file, install e-mail, or let ten people use the same data file at the same time, the helpful folks on the Connectivity Clinic Forum have opinions, ideas, and insight they will freely share. Connect with us today! —Frank J. Derfler, Jr.

UTILITIES DATABASE Not to be confused with the Utiliforum, the Utilities Database is where you'll find every *PC Magazine* program, batch file, routine, index, and PC Labs Benchmark Test ever made available by the magazine. It's an easy-to-use database, but unlike PC MagNet's forums, you can't send messages to it. We've developed a search engine to help

COMPLETE YOUR LIBRARY

Be informed...Don't miss a word...
Order your missing back issues today!



12/27/88—Power Publishing: Design Features, Output, Ease of Use and Compatibility reviewed; PC LABS tests AppleTalk LAN and AppleShare PC Software; More.



12/13/88—Out the Cluster with 25 Personal Information Managers; FREE program manipulates data in Lotus 1-2-3; Software to help you trace family roots; More.



11/29/88—The LAN gateway into your PC double as an IBM 3270 terminal; WordPerfect 5.0 brings word processing to the DTP ideal; More.



11/15/88—NEC's Incredible 4-pound Laptop and 6 other 386s tested; LOTUS 1-2-3, Release 3.0, versus competitors; FREE directory to find tips up to 64K; More.



10/31/88—The 5th Annual AD-Printer Review; 16-page reference guide to Lasers and Dot Matrix; FREE tips and techniques to write efficient, effective batch files; More.



10/11/88—PC Labs tests 12 Portables; 9 LIM 4.0 Memory Boards; 13 Defragmenters; FREE utility to accelerate disk operation by 50%; More.



8/27/88—High-Impact Graphics—PC Labs evaluates 21 Image-Making Packages; 6 Turnkey Systems; 5 Animation Programs; two dozen design tips for slides; More.



8/13/88—the Hottest 386s; IBM, Compaq, ALR, and Hertz; 13 removable mass storage options; 3 twisted pair LANs; More.



8/6/88—Less is More, Compaq's Desqrow 386; Why you'll never buy another 286; PC Labs tests 12 High-End Programs; FREE program to write efficient C routines; More.



7/26/88—PC Labs tests 9 new boards; Toshiba 35100 packs 386 power; 21 programmable comp packages; 9 budget ATs; More.



6/25/88—Eleven 20-MHz options investigated; 27 Bar Code readers; Expert tips on type; 10 Fax challenges; More.



6/14/88—WORKGROUP COMPUTING, LAN Software and Utilities that do the job; FREE Utility that highlights life changes; More.



6/11/88—SAVE YOUR DATA; 16 easy backup programs; PC Magnet is introduced; 6 serious color printers; More.



5/17/88—The Changing Shape of Databases; PC Labs tests 43 Databases; FREE Utility to analyze your RAM disk needs; More.



4/25/88—20-MHz Model 80; IBM's best; PC Labs tests 13 8,000-sps Modems; First look at Ashton-Tate's Dbase IV.



4/12/88—Affordable Desktop Publishing; PC Labs tests 6 inexpensive Desktops; Special Q&A coverage—How to install it, what applications to use; More.



3/29/88—Power to Go; 12 New Portables Hit the Road—Pick Your Price and Performance; IBM's super-bi-res PS/2 display adapter; More.



3/15/88—Great Graphics at your Fingertips; PC Labs tests 7 PS/2 add-in memory boards; 10 top-charting packages; 16 integrated word processors examined; More.



2/29/88—PC Labs tests 55 word processors; 1987 tax prep software; IBM's 20-MHz PS/2 Model 80 benchmarked; living with laser printers; More.



2/16/88—PC Labs tests 21 AT clones priced under \$2,000; mastering laser printing; 14 bargain spreadsheets; More.



1/26/88—IBM's OS/2 reviewed; PC Labs tests 20-MHz Desktops; do-it-yourself 386s; 17 Lotus 1-2-3 add-ins; add-ons for word processors; More.

ORDER TODAY, QUANTITIES ARE LIMITED! Just return the attached coupon below or a clearly written order on a separate sheet of paper. Other issues available. Call 1-609-354-4975. Mail Orders only.

PLEASE SHIP ME THE COPIES I'VE CHECKED. I am enclosing \$8 for each issue ordered (\$9 in Canada and all other foreign countries, U.S. currency only).

- ☐ 12/27/88 ☐ 12/13/88 ☐ 11/29/88 ☐ 11/15/88
☐ 10/31/88 ☐ 10/11/88 ☐ 9/27/88 ☐ 9/13/88
☐ 8/88 ☐ 7/88 ☐ 6/26/88 ☐ 6/14/88
☐ 5/31/88 ☐ 5/17/88 ☐ 4/26/88 ☐ 4/12/88
☐ 3/29/88 ☐ 3/15/88 ☐ 2/29/88 ☐ 2/16/88
☐ 1/26/88 ☐ Others _____

Send to:
Ziff-Davis Publishing Company, Attn: F. Hunter
P.O. Box 5999, Cherry Hill, NJ 08034

☐ Check/Money Order enclosed \$ _____

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

WAREHOUSE DATA

PRODUCTS

**SAVE
60%
ON OUR
EVERYDAY
PRICES**

**SINCE 1979, servicing our PC buyers with low pricing,
technical experience – and reliable service.**

SOFTWARE

ACCOUNTING

Bedford	\$139
Das Easy A/C, Ver 3.0	85
Das Easy Light	39
Dollars & Sense	39
Managing Your Money 5.0	117
One Write Plus	143
Practice Business Accounting	146
Practice W/PDQ	229
Quicken	38

COMMUNICATION PROGRAMS

Brooklyn Bridge Universal	\$75
Carbon Copy Plus	109
Close-up	92
Crestlink XVI	92
Crestlink XVI	110
Desktop	64
Flying Dutchman	84
Lap Link Plus	75
PC Anywhere II	69
Relay Good 3.0	143
Smartcom III	146

PROJECT MANAGER

Microsoft Project	Call
Super Project Plan	\$265
Timeline Pro Ver 3.0	364
Total Harvest Manager 3	359

DATA BASE MANAGERS

Clipper	\$410
Conдор	329
DataPerfect	283
D Base IV	654
D Base IV Programmer's Edition	719
DB-XL Diamond 1.2	110
For Base Plus 2.1	180
Genie	189
KnowledgeMan 2	285
Paradox 3.0	489
PFS: Professional File 2.0	185
Powerbase 2.3	186
QA 3.0	425
Quickvision Diamond 1.2	329
R Base For DOS	450
Reflex	90
Relate & Report	112
VP Info	83

DESKTOP PUBLISHING

Pagemaker Ver. 3.0	\$475
PFS: First Publisher 2.0	73
Ventura Publisher 2.0	277
Ventura Pro EXT	377

DISKETTES

Maxell 5 1/4 DS/DD	\$34
Maxell 5 1/4 DS/DD	11
Polaroid Diskettes 25/20	8.98
3M 5 1/4 DS/DD	39
3M 5 1/4 DS/DD	39
3M 500A Data Tapes	29
3M Tape Cartridges	Call
Verbatim DS/DD	Call
Verbatim DS/DD	19
Verbatim 3 1/2 HD	19
Verbatim 3 1/4 HD	43

DOS

IBM4.01	\$119
MS-DOS4.01	119

ENTERTAINMENT

Chuck Yeager Flight Simulator	\$35
Falcon AT	32
F15-Strike Eagle	24
Guts'n'Guns	39
Hacker II	30
Jack Nicholas	25
Jell	39
Kings Quest	30
Kings Quest IV	30
Microsoft Flight Simulator 3.0	33
Scenery Disk 1.7	17.95
Silent Service	30
Speller Bee Advance	30
Star Flight	40
Sub Battle	30
Where in the World	29
Many More Titles Available	Call

GRAPHICS

Bizstream Fonts	\$119
Charisma	299
Diagram Master	156
First Graphics	87
Graph	79
Harvard Graphics 2.12	365
In-A-Vision	296
Magnum	216
Microsoft Chart 3.0	225
Newsroom	31
Newsroom Professional	46
Printmaster Plus	25
Printshop	33
Printshop Companion	28
Print Shop Holiday	29
Shop Planner Fax	169
Signmaster	132

INTEGRATED

Enable OS	\$352
First Choice	84
Framework III	419
Microsoft Works	83
Smart Software	380
Symphony 2.0	410

LANGUAGES

Brainmaker	Call
Microsoft C#1	\$295
Microsoft QuickBase 4.5	85
Microsoft Quick C 2.0	65
Ryan McFarlan Fortran	390
Ryan McFarlan Cobol	612
Turbo Basic 1.01	89
Turbo C 2.0	90
Turbo Pascal 5.0	90
Turbo C Pro	162
Turbo Pascal Pro	162
Turbo Prolog 2.0	90
Turbo Prototyping Toolbox	85

ELECTRONIC ARTS*

	Sug.	Ret.	Our Price
Chuck Yeager	.....\$55		\$35
Chessmaster 2100	.....\$50		\$32
Abrams Battle Tank	.....\$45		\$28
688 Attack Sub	.....\$55		\$33

Brand Name Daisy Wheel Printer \$155 \$499

Quantities Limited. Prices Good Thru 4-30-89.

CALL NOW!

EDUCATIONAL

Mavis Beacon Teaches Typing	\$30
Microsoft Learning DOS	30
Turbo Tutor II	48
Typing Tutor IV	30

UTILITIES

Always	\$85
Battery Watch	25
Copy II PC	19
Copywrite	52
Cora Fax	75
Cult	39
D & A V.E.	58
Designview 2.2	72
Direct Access	49
Desk Manager	59
Easy Calc	49
Eureka	49
Feedback Plus 2.01	104
Fastrak	39
Formtools	58
Formworks	95
Grapher	39
Graphics in the Box Release 2	73
Hot	89
HTEST	89
Lotus Metro	89
Mace Dots	79
Prokey 4.0	95
Microsoft Windows 386	117
Norton Advanced 4.5	75
Norton Commander 2.0	48
Norton Utilities 4.5	48
Numerical Methods	95
Org Plus Adv	129
PC Tools Deluxe 5.0	37
Sidekick 4.0	70
QDOS III	49
Rightwriter	85
Sidekick Plus	132
Sidekick	38
SOZ Plus	85
Super Key	85
Turbo Lighting	86
TTree Pro	64

SPREADSHEETS

Lotus 1-2-3	\$275
Lotus 3D	88
Microsoft Excel	240
Plan Perfect	199
Quattro	156
Spreadsheet Auditor	82
SuperCalc 5	299
Surpass	329
Twin Advanced	89
VP Planner Plus	117

CAD & ENGINEERING

Autosketch Enhanced	\$61
DesignCad 2D or 3D	148
Easy Erite	84
Gamma III	49
FairCad	1565
Generic Cad	49
Generic Cad Level 3	49
MathCad 2.0	245

WORD PROCESSING

Sorted Sprint	\$122
Easy Erite	84
Gamma III	49
Grandview	188
Lotus Manuscript	119
Microsoft Word 5.0	119
Multimate Advantage II	209
MS Professional Write	112
SP/PC 2.0	166
Versity	34
Volunteer 3	129
Webster Spellcheck Pro	33
Webster Thesaurus	39
Will Maker	34
Word Perfect 5.0	129
Word Perfect Executive	214
Word Perfect Library 2.0	55
Wordstar ProPack 5.0	239
Wordstar 2000 Plus	305
Wordstar 2000 Plus Legal	299
Xyrite III Plus	219

WAREHOUSE DATA PRODUCTS

Division of AZ Computer Corporation
2727 W. Glendale Ave. • Phoenix, AZ 85051

USER FRIENDLY TERMS & CONDITIONS

- We welcome international accounts, please call for special pricing
- Volume discounts for corporate and institutional orders
- We do not charge your credit card until your order is shipped.
- Shipping minimum is \$5.00. Arizona orders + 6% sales tax
- Personal/company checks allow fourteen (14) days to clear

TO ORDER IN THE USA AND CANADA CALL 1-800-421-3135

We gladly assist the first time buyer as well as the professional systems analyst. Call our toll-free technical service at 1-800-421-3135.

HARDWARE

ARC PRO TURBO 88

Base Unit \$749

w/Monochrome Monitor	888
w/Color Monitor	988
+64K 4.779 34 MHz	
+Color Mono Graphics Card	
+84 Key Keyboard	
+2-RS-232 Serial Port	
+1-Parallel Printer Port	
+1-Clock Calendar	
+MS DOS 3.3	

ARC PRO TURBO 286

Base Unit \$1319

w/Monochrome Monitor	\$1408
w/Color Monitor	1588
w/EGA Monitor	1808
+1MB RAM 6/12 MHz	
+EGA/MDA Graphics Card	
+101 Key Keyboard	
+2-RS-232 Serial Ports	
+1-Parallel Printer Port	
+1-Clock Calendar	
+MS DOS 3.3	

ARC 386 Skyscraper

Call

ACCESSORIES

Copy II PC Deluxe Board	\$191
Curis Ruby Plus	66
Keytronics Keyboards	Call
Logical Connection 256K	479
Mach III Jacket	36
Masterpiece	85
Masterpiece Plus	109
NTC 101 Keyboard	89
Shed-Watt	Call
Targus Laptop Bags	Call
150 Watt Power Supply	85

BOARDS

AST Addapeak Premium 512K	\$429
AST I/O Mini XT	849
AST Rampage 2	249
AST Rampage 266 Plus 512K	289
AST Sasic Plus/64K	Call
AST X28mer	899
Everest RAM 3000	99
Everest Magic Card 16	99
Everest Multi Function EMS	79
Everest Magic I/O	Call
Everest 386 PC	Call
Intel Above 286 Plus	Call
Intel Connection Co-Processor	728
Microsoft Mach 286	287
Orchid Tiny Turbo	299

CO-PROCESSOR

INTEL	
80287	Call
80287-15	Call
80387-15	Call
80387-20	Call
80387-33	Call
80387-33X	Call
80487-2	Call
80487	Call

LAPTOP COMPUTERS

Sharp Laptop	Call
Toshiba T-1000	Special
Toshiba T-1200PB	Special
Toshiba T-1600	Special
Toshiba T-2000	Special
Toshiba T-3100	Special
Toshiba T-3100E	Special
Toshiba T-3600	Special
Toshiba Accessories	Call
Zenith Laptop	Call

VIDEO BOARDS

AST VGA Plus	\$349
ATI EGA Wonder 800	229
ATI VGA Wonder	Call
EVEREX EGA EV673	249
Genoa S300 and S400	Call
Hercules Graphics Plus	179
Orchid Designer 800	249
Orchid Pro Designer	299
Orchid Pro Designer II	408
Orchid Pro-Designing EGA 480	179
Paradise VGA Plus	Call
Paradise VGA Pro II	486
Vega V RAM	486

AT&T

AT&T 8300 WGS, 10MHz	\$899
AT&T 8286 WGS, 12MHz	1395
AT&T 8386 WGS, 16MHz	2067
AT&T 8386, 20MHz, 135 MB H.D.	4395
AT&T 8386E, 20MHz, 135 MB H.D.	4950
Lat Server Tower	4950

UPS

Triphase UPS BC450	\$399
Emerson	
UPS 200	289
UPS 300	399
UPS 600	645
UPS 1500	1259

MICE/SCANNERS

Complete Scanners	\$149
Delecoy	Call
Delecoy PC Scan	Call
DFI Scanner	180
Logitech Clear	63
Logitech HiRes	73
Logitech PS-2	57
Logitech Scanman	188
Logitech Serial	86
Microsoft Bus w/ Paintbrush	92
Microsoft Serial w/ Paintbrush	92
Panasonic FX-505 FX-506	Call

FLOPPY DRIVES

Teac 5 1/4" 360K	\$79
Toshiba 3 1/2" 1.44 MB	129
Toshiba 3 1/2" 720K	109

HARD CARDS

Plus Hardcard 20 MB	\$819
Plus Hardcard 40 MB	849
Plus Passport 20 MB	849
Plus Passport 40 MB	839
TMG Cardrive 20	349
TMG Cardrive 30	369
TMG Cardrive 50	529

HARD DRIVES

Bemoull 44MB	Call
Bemoull 8120L	\$779
Bemoull 8120X	1049
Bemoull B220X	1895
Core Hard Drives	Call
MiniScribe	Special
Priam	Call
Seagate 20 MB w/Cont	259
Seagate 30 MB w/Cont	279
Seagate PS/2 25, 30, 20MB	339
Seagate ST 128 w/Cont	379
Seagate ST 128 w/Cont	389
Seagate ST 251	349
Seagate ST 4096	885

MONITORS

AMDEK 410	\$145
Magnavox RGB	254
Mitsubishi Diamond Scan	509
NEC GS	235
NEC Monochrome Card	1399
NEC Multisync 2A	829
NEC Multisync 3D	Call
NEC Multisync II	599
NEC Multisync XL	2099
Princeton Max 12	138
Princeton Max 15	249
Princeton Ultra 16	Call
Princeton Ultra Sync	509
Samsung CM 4531	369
Samsung TTL Amber	79
Samsung Flat	89
Samsung RGB with	249
Samsung Multisync	449
Sigma 1430	599
Signal Laserview	Call
Sony Multiscan 1302	739
Viking	
Viking 2.0	889
Viking To Color	2369
Viking 2400	1269
Zenith 1490	669

MODEMS

Everest 300/1200	889
Everest 2400 INT	139
Everest 2400 MNP INT	169
Everest 2400 MNP EXT	169
Everest Mini 1200	95
Hayes 1200	299
Hayes 2400	439
Holmes 1200 INT	179
Holmes 2400 INT	254
U.S. Robotics 2400E	338
U.S. Robotics 1600 HST	899
U.S. Robotics Courier 2400	289
U.S. Robotics Sportster 1200	95
U.S. Robotics Sportster 2400	133

PRINTERS

ALPS	
Allegro 24	349
CITIZEN	
120 D	\$148
160 D	169
MSP 40	289
MSP 45	415
MSP 45	289
Trident 124	455
EPSON - Call on all models	
NEC Products	Call
OKIDATA - Call on all models	
OKI325321	Call
OKI390	499
OKI391	679
OKI393	885

PANASONIC	
1092-1	329
1124	339
1151	199
1204	254
1524	589
1592	409
3121	329

STAR MICRONICS	
NX 1000	179
NX 1000/Color	239
NX15	309
NX 2400	349

TOSHIBA	
321 SL	499
341 SL	889
351 SX	999
P311	967

LASER PRINTERS

AST Turbo PB	Call
Chindia Laser 6w/1F	\$1919
Panasonic 4450	1699
Toshiba Page Laser	2629

DIGITIZERS

Kurta Tablets 25 One 12 x 12	\$295
Summa Graphics 12 x 12	349

* All shipments insured at no extra cost
* All prices are subject to change without notice
* We do not guarantee compatibility

Technical Support: 1-800-421-3135
FAX (602) 246-7805
Phone Hours: Monday thru Friday 8:30 a.m. - 9:00 p.m. MST
Saturday 9:00 a.m. - 5:00 p.m. MST

CIRCLE 171 ON READER SERVICE CARD

**CALL FOR
ITEMS NOT SHOWN**
1-800-421-3135 • 1-602-246-2222
2727 W. Glendale Ave., Phx. AZ 85051

■ PC LAB NOTES

you find the file you're looking for quickly, and without using valuable connect time.


Here is the fastest way to download a *PC Magazine* program:

- Log on to PC MagNet.
- Enter GO UTILITIES or choose (3) Search for PC Magazine Utilities and programs from the top menu.
- Choose (4) Direct Utility Download

- Enter the filename (or just the first four letters)
- Select the file from those presented.
- Read the description of the file.
- Answer (Y) to Do you wish to download this file?
- Press the Enter key to see transfer protocol options.
- Choose a protocol (see sidebar "Choosing a Download Protocol").
- Download the file.

If you need further help downloading from PC MagNet, just call Customer Service. Representatives are available from 8:00 A.M. to midnight Monday through Friday, and from 2:00 P.M. to midnight on weekends (Eastern Standard Time). Holiday hours will vary. To reach Customer Service call (800) 848-8990 within the contiguous United States, except Ohio. From within Ohio or from outside the United States, call (614) 457-8650.—*Christopher Barr*

UPLOADING TO PC MAGNET PC MagNet makes many things easier for our readers, including sending Productivity column submissions. The Upload a Submission to *PC Magazine* section includes:

- Power Programming, for C and MASM programming suggestions
 - Spreadsheet Clinic, for spreadsheet macros and formulas
 - User-to-User, for DOS batch files and DEBUG scripts
 - Power User, for application program and hardware tips
 - Languages, for BASIC, Pascal, C, FORTRAN, and COBOL
 - PC Tutor, for inquiries about general DOS and PC topics
 - Connectivity Clinic, for networking suggestions
 - PC Advisor, for hardware and software purchasing advice
 - Letters to the Editor, to state your comments about articles. (To write a letter online rather than upload a file, use the "Type a Letter to the Editor" facility.)
- Your name and address should be included with all submissions. Questions sent to the advice columns are forwarded to the editors for publication. And for an even faster reply, post a message in one of the forums.—*Michael Cohn* 



K.I.S.S.*

A network doesn't have to be complicated - especially when it's built around a MainStreet data controller from Newbridge. It lets you share peripherals, network PCs and expand access to host computer ports with much less complexity and at a fraction of the cost of a LAN. In fact, prices start at just over \$100 per port. A MainStreet data controller is simple to install, operate and maintain; it plugs directly into existing RS232 or parallel ports; no additional PC interface cards are required; it uses standard twisted pair wiring which probably exists in your office walls; laptops can be networked; and English commands with straightforward online help make networking easy.

U.S.: 1-800-332-1080
 HARRISON, VA.
 CANADA: 1-800-267-6246
 OTTAWA, ONT.

 **NEWBRIDGE**
 * Keep Information Systems Simple

Newbridge and logo, and MainStreet are trademarks of Newbridge Networks Corporation

CIRCLE 149 ON READER SERVICE CARD

Free up your credit for other purchases while putting Northgate computing power at your fingertips.

Northgate gives you credit

Introducing...
the Northgate "Big N"
Revolving Credit Card



Not a lease— you own it!

Works just like your VISA, MasterCard, American Express or other card.

Just fill out the "Big N" credit information. Send it in at once. Prompt approval...your credit limit is based on your credit worthiness.

Then call Northgate. One of our expert system consultants will help design the system that best meets your needs. Then just say...

CHARGE IT!

Northgate offers flexible long-term lease plans too. Suited to fit your needs. With up to five years terms, if cash conservation is your concern, ask about leasing your system with Northgate.

PHONE NORTHGATE NOW...

A. Your Personal Information										Requested Line of Credit \$	
Your Name: First		Initial	Last	Date of Birth: Day		Mo	Yr	Social Security Number:			
Present Address: Street		Apt. #	City	State	Zip	Home Phone ()					
Date of Residence: Month		Year	Monthly Payment: \$				Buy <input type="checkbox"/>		Rent <input type="checkbox"/>	Other <input type="checkbox"/>	
Previous Address:		Dates of Residence: From		To		Monthly Income: Gross \$		Net \$			
Your Employer: (if self-employed, complete section "d")		Date of Employment: Mo		Yr	Position:		Business Phone: ()				
Employer's Address: Street		City	State	Zip	Dates of Employment: From		To				
Previous Employer:		Address:		Dates of Employment: From		To		Monthly Income: Gross \$		Net \$	
Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as a basis for receiving this obligation.		Other Income:		I have received since (Date)		Monthly Income: Gross \$		Net \$		Relationship	
Name and Address of Nearest Relative Not Living With You											

Let Northgate start building your computers...TODAY!

Use Our Toll Free Order Number

1-800-548-1993

New Canadian Toll-Free Order Hotline
1-800-338-8383

Hours: M-F 7am-8pm CST, Sat. 9am-3pm CST



13895 Industrial Park Blvd., Suite 110, Plymouth, MN 55441
From Canada and Foreign Countries call:
Corporate Headquarters: (612) 553-0111 • FAX (612) 553-1695
For corporate and institutional sales in Oklahoma, Texas and Louisiana, call (512) 343-7291

IT TAKES GENIUS TO MAKE POWER PERFORM LIKE THIS.



BEAUTY, GRACE, CLASS

— the fine art of creating micro-computers so powerful you'll want to applaud their genius.

● The people at PC Designs engineer high-quality, high-performance equipment that is leaving the competition flat-footed. And their **Service and Support**, including Sorbus™ maintenance contracts, are without equal. ● Everything done by PC Designs is done with class and innovation. Consider their new GV386PLUS as just one premier example — **Speed**, **Expandability**, and **Memory** configurations. And a price that will leave you room for shopping for their other options, such as high-powered hard disks and printers. ● When you need to take that **Next Step** in computerization, call PC Designs. They're the people who know how to make power perform.

**PUTTING THE POWER
IN YOUR HANDS**

**CALL US AT
1-800-322-4872**
(outside Oklahoma)

MICRO 286 — \$985.

- 80286, 10MHz
- 512KB, zero wait-state
- 1 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- 101-key keyboard

GV 286* — \$1299.

- 80286, 12MHz
- 512KB, zero wait-state
- 32KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- 101-key keyboard

* PC Magazine's Editor's Choice on October 13, 1987. Ranked #1 in PC Week's Poll of Corporate Satisfaction, October 17, 1988.

GV 386/16 PLUS — \$2399.*

- 80386, 16MHz
- 1MB, zero wait-state
- 64KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- WEITEK & 80387 support
- Up to 16MB of 32 bit memory

*FCC approval pending

GV 386/20 PLUS — \$2799.*

- 80386, 20MHz
- 1MB, zero wait-state
- 64KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- WEITEK & 80387 support
- Up to 16MB of 32 bit memory

*FCC approval pending

VIDEO

- Mono card and monitor — \$175.
- EGA card and monitor — \$589.
- VGA card and NEC MultiSync II — \$909.

HARD DISKS

- Priam ID45H (45MB, 28MS) — \$489.
- Priam ID62 (70MB, 28MS) — \$659.
- Priam ID130 (160MB, 28MS) — \$1425.
- Maxtor AT140 (140MB, ESDI, 11MS) — \$1799.



NOVELL

Sorbus™
A Bell Atlantic Company

HOURS — 8:00-6:00 CST, Monday-Friday

9:00-3:00 CST, Saturday

CALL US AT — 1-918-251-5550 (in Oklahoma)

1-918-251-7057 (Fax)

BBS ON-LINE 24 HRS — 1-918-252-9137

All prices are subject to change without notice.

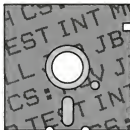
PC Designs

2500 N. Hemlock Circle • Broken Arrow, OK 74012
(on 61st, west of 149th E. Ave.)

CIRCLE 372 ON READER SERVICE CARD

■ UTILITIES ■ MICHAEL HOLMES AND BOB FLANDERS

LANDSCAPE MODE TO THE RESCUE



You can save time and paper printing out program listings and other ASCII files on your LaserJet. This handy formatting utility puts two full pages on a single sheet.

As ream after ream disappears into the maw of your laser printer, you may find yourself mordantly recalling that not long ago people confidently predicted the coming of the "paperless office." It's so easy today to print out a fresh copy of a slightly modified file that laser printers are becoming an ecological threat.

You can simultaneously salve your conscience and speed your work, however, by using LASERLST. This utility formats text files so that two 66-line by 81-character pages of information are printed out side by side on a single page, as Figure 1 illustrates. The result does more than cut your paper costs in half. In many applications, such as tracing through program listings or editing rough drafts that may need reorganization, it's important to put as much information as conveniently possible on a single page so that you can see it as a whole.

To give credit where it's due, the idea for LASERLST came from PPRINT, a shareware program created by Norm Patriquin. PPRINT is available for downloading from many user BBSs and offers many additional capabilities. LASERLST concentrates simply on accurately emulating PPRINT's 2up facility.

As explained in the accompanying sidebar "LASERLST by Modem," a ready-to-run copy of LASERLST can be downloaded from PC MagNet. Its assembly-language source code, LASERLST.ASM, is printed here, as is the listing, LASERLST.BAS, which will automatically create LASERLST.COM when you

run it once in BASIC. Both LASERLST.ASM and LASERLST.BAS can also be downloaded from PC MagNet.

USING LASERLST In order to use LASERLST, you must have an HP LaserJet or compatible printer. The program itself is approximately 1,500 bytes long, though it may actually require up to 36K while

running. The command syntax for LASERLST is

```
[d:][path]LASERLST infile [outfile] [/Tn]
```

The *infile* parameter is the DOS filename to be printed by LASERLST. This parameter may be a fully qualified filename; that is, it may contain the drive and path where the file(s) can be found. For ease in print-

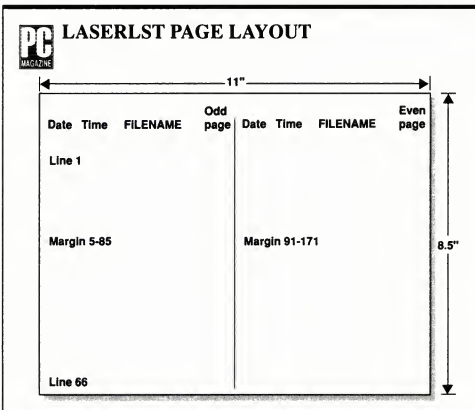


Figure 1: This is the page format used by LASERLST to print two regular pages on one page in landscape mode. Using LASERLST will help you cut your paper costs in half.

Second, as a general rule, the file should not contain printable lines longer than 81 characters. Longer lines will be broken after the 81st character, and the remainder will be printed on subsequent lines, as necessary. Usually, `LASERLIST`

(continues)

258

Either Way You Look at It, Peachtree Accounting Saves You Money.



PEACHTREE'S DOUBLE BONUS BUNDLE

Includes Peachtree Complete II
plus
Peachtree Data Query II

JUST
\$298

SAVE \$100

- With PDQ II Enhanced! You Can:
- Create on screen inquiries to display data
 - Present data in line or bar graphs
 - Use any of over 20 pre-defined reports
 - Modify pre-defined reports and save the formats
 - Create your own reports and save the formats
 - Transfer accounting information to spreadsheet and database programs like dBASE III® and Lotus 1-2-3®

And More!

A Recent Survey by the
American Institute of
CPAs Reports More
Accountants Use and
Recommend Peachtree
Than Any Other
Accounting System!

When it comes to accounting software, no one offers you more for your money than Peachtree. Now we're offering you two ways to buy our best-selling accounting software — and two great ways to save.

Peachtree Complete™ II is our premier business accounting system. Designed and sold as a \$5,000 accounting system, the latest version of Complete II represents a vastly expanded and greatly improved package that sells for an unbelievably low \$199. Find out what over 250,000 satisfied users already know — no other accounting system offers so much for so little.

And now, for businesses who want to make the most of their accounting information, Peachtree's Double Bonus Bundle gives you Peachtree Complete II Accounting plus its own custom reporting tool, Peachtree Data Query II™ Enhanced. The Double Bonus Bundle includes both systems — regularly priced at \$199 each — for just \$298. That's a savings of \$100! Either way, Peachtree offers you the most accounting you can get for your software dollar.

Peachtree Complete II is a comprehensive accounting system developed to meet the needs of small- to medium-size businesses. It comes with eight high-power modules that may be used individually or fully integrated for maximum accounting efficiency:

- General Ledger
- Accounts Payable
- Inventory
- Fixed Assets
- Accounts Receivable
- Invoicing
- Job Cost
- Payroll

And Peachtree Complete II is designed using the latest software innovations, like full-color scrolling reference tables, pop-up windows, and short-cut keyed menus. We've expanded to allow an unlimited number of companies, added service invoicing, range printing, and more.

Peachtree Complete II's error handling is quick and easy, with plain English messages and suggestions. Context-sensitive **Smart HELP** is on-line, all the time. And as always, Complete II comes with the most thorough documentation — a separate quick-start installation Guide, Accounting Primer, seven-volume Reference Library, and extensive on-line tutorials on each module — all at no extra charge.

Now you can extend the power of your Peachtree accounting to include custom reporting and analysis, and save even more money! Order the Double Bonus Bundle and you'll get Peachtree Complete II, plus Peachtree Data Query II Enhanced, for just \$298.

PDQ lets you turn raw figures into highly sophisticated reports, allowing you safe, easy access to valuable information from all eight Peachtree Complete II modules. PDQ's simple, clear approach gives you maximum control and flexibility. You tell PDQ what information you need, and PDQ looks through your accounting files, finds it, and presents it to you any way you want it — on screen or printed, as a graph, in report form, or ready for export to another software package.

You can begin creating reports in just minutes, thanks to all new user instructions and on-line practice sessions that lead you through the system and build confidence as you go. With Peachtree's Double Bonus Bundle, accounting and custom reporting go hand-in-hand, and that makes good business sense.

MONEY BACK GUARANTEE. We stand behind Peachtree Complete II and PDQ II with a toll-free hotline for technical support (\$1 per minute, \$20 minimum on your credit card) and a 30-day money-back guarantee when you buy directly from Peachtree. If for any reason you're not satisfied, you can return your package within 30 days for a prompt refund. That's the Peachtree Software promise. A \$25 restocking fee applies to all returns.

Peachtree Complete II: the Business Accounting System for just \$199, and Peachtree's Double Bonus Bundle for just \$298. Either way you look at it, Peachtree Software saves you money. Order today!

HARDWARE SPECIFICATIONS: Requires PC/10-DOS version 2.0 or higher with 104K of usable memory (128K required with DOS 3.1) and a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PS XT, Personal System/2™ and compatibles. 3 1/2" media optionally available. Not copy protected.

Lotus 1-2-3 is a registered trademark of Lotus Development Corporation. dBASE is a registered trademark of Adbase - The Corporation. IBM is a registered trademark and Personal System/2 is a trademark of International Business Machines.



PEACHTREE COMPLETE II

STILL ONLY
\$199

- General Ledger
- Chart of accounts includes 76 suggested and 26,000 user-defined accounts.
 - Comparative financial statements.
- Accounts Receivable & Invoicing
- Estimates open from on balance forward customers.
 - Up to 14,000 customers.
 - Prints product or service invoices.
- Accounts Payable
- Partial pay memos of invoices.
 - Up to 14,000 vendors.
 - Checks printed with unlimited invoice listing on stub.
- Inventory
- Superior average and standard costing methods.
 - Up to 19,500 inventory items.
- Fixed Assets
- Handles 15,000 assets and 15 methods of depreciation.
- Job Cost
- Tracks costs and profitability on a job-by-job basis.
- Payroll
- Built-in current year tax tables.
 - Prints checks, W-2s and more.
 - Processes up to 3,000 employees.

And More!

Call Now to Order
1-800-247-3224
(or call 1-404-564-5800)



To Order by Mail Add \$12.50 Shipping and Handling.*
(In Georgia add applicable sales tax.)

Peachtree Software

4355 Shackelford Road, Dept. PCM, Norcross, Georgia 30093

* Telephone number required on all orders.

Now Peter Norton

If you've ever seen the words "GENERAL FAILURE ERROR" on the screen of your PC, you know you don't need to be ill to feel sick.

All you need is a corrupted disk with some valuable data stored aboard.

When that happens, it's time to call on the remarkable new *Norton Disk Doctor*.

The Norton Disk Doctor is one of 27 data recovery and disk management tools in the latest Advanced Edition of the Norton Utilities.

It's also the most significant advance in utility software technology since Peter Norton first began saving the data and the derrières of grateful PC

❏ FILE NOT FOUND!

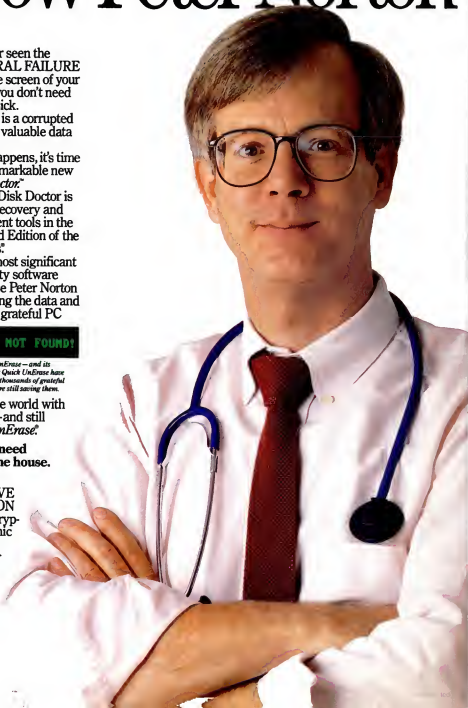
Our legendary UnErase — and its short-circuiting offspring Quick UnErase have saved the derrières of thousands of grateful PC users. And they're still saving them.

users around the world with the legendary — and still unequalled — *UnErase*.

**Why you need
a Doctor in the house.**

Now, whenever INVALID DRIVE SPECIFICATION or some other cryptic or catastrophic error message appears on your screen, you can do something besides reach for the Maalox.

You can summon the Disk Doctor, which will



makes house calls.



The Standard Edition gives you UnErase, the new Norton Control Center and a range of features, functions and enhancements.

determine the exact nature of the problem, report it and, in most cases, fix it for you.

All by itself.

The Disk Doctor can diagnose and repair everything from bad partition tables and boot records to mangled root directories. It can even reformat bad sectors and write back the old data.

Automatically.

In fact, if the Doctor can't cure your corrupted floppy or hard disk, then Buster, you've got one corrupt disk.

In which case, you'll need to refer to *The Norton Troubleshooter*, a 158-page guide to finding and fixing most anything that could go wrong.

Don't worry, you don't have to go to the bookstore or the library to refer to it, because the *Troubleshooter* is included in the Advanced Edition.

Frankly, the Norton Disk Doctor and the Norton Troubleshooter are worth the price of the new Advanced Edition all by themselves.

But, of course, they aren't by themselves.

They're accompanied by a wish list of features, functions and enhancements sufficient to satisfy the yearnings of all those people who've been politely writing and calling to request them.

The people's choices.

Like *Speed Disk*, the world's most powerful disk tuning tool, which features four user-selectable optimization methods and doesn't lose your data if you lose power.

And *Format Recover*, which can unformat your accidentally reformatted hard disk even if you haven't taken any precautions beforehand.

Our user interface, which *InfoWorld* said made the Utilities "as easy to use as possible," now comes with pop-up windows and dialog boxes.

Our new *Norton Control Center* lets you define or alter a range of system settings—from cursor size to screen and palette colors—quickly and easily.

While our *Disk Test* finds and marks faulty areas on your disk to help you protect your data before you have a chance to lose it.

If you want to lose it, however, you'll be glad to know that *WipeFile* and

WipeDisk support DoD 5220.22-M 116c(6b), the Pentagon's latest data security specification.

Which means they'll erase your files so thoroughly not even Peter Norton can find them.

You'll find the latest Norton Utilities at your favorite software dealer.

If you haven't got a favorite software dealer, take two aspirin, call us right away at 1-800-365-1010 and place an order.

The Doctor will be on its way in no time.

Peter Norton
COMPUTING

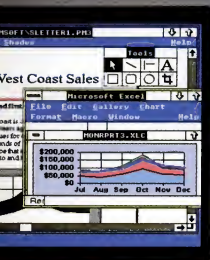
All Utilities now support large hard disks under DOS 4.0, COMPAQ DOS 3.31, and the PC MOS/386 multi-tasking operating system. Designed for the IBM® PS/2 and PC families and 100% compatibles. © 1988 Peter Norton Computing, Inc. 100 Wabash Blvd., 9th Floor, Santa Monica, CA 90401-1104



The Norton Disk Companion is included, free, with both the Standard and Advanced Editions. The Norton Troubleshooter is yours with the Advanced Edition.



Push your software to the limit.



If you want to get the most out of today's new, high-powered software applications, we have a few words of advice:
Use a Microsoft® Mouse.



The Microsoft Mouse gives you easy access to all the powerful features today's software has to offer.



It looks innocent enough here, but wait until you see how the Mouse makes your software scream.

The Mouse can unleash your software—and take full advantage of the features intended to make your work easier.

With the Mouse you can effortlessly manipulate menu-driven applications without taking your eyes off your screen. You can pull down menus. Highlight text in one fell swoop. Copy, cut and paste formulas in spreadsheets easily. And move things from here to there without any command-key mumbo jumbo.

Literally hundreds of applications support the Mouse. But as the leading software developer for personal computers (and one of the first to bring a graphical interface to PC screens), we've gone a step further:

Microsoft Windows/286 with PC Paintbrush® for Windows, Microsoft Paintbrush or EasyCAD™2 actually come with the Mouse (or vice versa).

Already, the Microsoft Mouse has made its way into the hands of over one million personal computer users. And that number is sure to grow even faster. After all, graphically oriented software is the driving force behind improved productivity.

But it's the Microsoft Mouse that puts you in the driver's seat.

Microsoft®
Making it all make sense.™

© 1989 Microsoft Corporation. All rights reserved. Microsoft and the Microsoft logo are registered trademarks and the Microsoft Mouse design and Making it all make sense are trademarks of Microsoft Corporation. EasyCAD is a trademark of Evolution Computing. PC Paintbrush is a registered trademark of ZSoft Corporation. For more information, call (800) 541-2201. Customers in Canada call 1-416-679-7638, outside North America, (206) 882-8661.

PRODUCTIVITY

[illegible]

Add power to your system with 2 FREE PC Magazine Utilities Disks

Plus SAVE 62% when you subscribe to PC MAGAZINE

- You're Guaranteed Delivery of
- in-depth product reviews based on the impartial evaluations of our own PC Magazine Labs.
 - Power-User Tips and Techniques to help you work faster and smarter.
 - The best, hottest columns anywhere.

Get 2 FREE DISKS The PC Magazine 2-Disk Utilities Library: Vol. 1 and the *all new* Vol. II features 78 power-user programs that will really rev-up your system! Speed up your keyboard... locate any file in seconds...back up all your data with ease...add a DOS system to a working disk. Not available in any store, these valuable disks are yours FREE with your paid subscription.

SAVE 62% That's like getting almost 2 out of 3 issues plus home delivery free—so you won't miss a single, valuable issue.

The PERFECT GIFT!

Give another power-user—a business associate or friend—a gift subscription to PC Magazine. They'll appreciate getting the late-breaking, in-depth coverage of IBM-standard hardware and software 22 times a year—plus the 2-Disk Utilities

Library, as an extra special gift. And we'll send along a gift card to announce your thoughtful present.



PC MAGAZINE

FREE DISKS/SAVE 62%

YES!

I want my Free, 2-Disk Utilities Library and all the power and input PC Magazine provides. Enter my subscription for:

- ☐ 44 issues (2 years) for \$49.97. SAVE 62%
☐ 22 issues (1 year) for \$29.97. SAVE 54%
 Savings based on annual newsstand price of \$64.90.

Mr./Mrs./Ms. _____ (Please Print)

Company _____

Address _____

City _____ State _____ Zip _____

☐ Payment enclosed. ☐ Bill me later.

4N393

Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. Your disks will be shipped upon payment. Basic annual subscription price is \$44.97.



PC MAGAZINE

FREE DISKS/SAVE 62%

YES!

I want my Free, 2-Disk Utilities Library and all the power and input PC Magazine provides. Enter my subscription for:

- ☐ 44 issues (2 years) for \$49.97. SAVE 62%
☐ 22 issues (1 year) for \$29.97. SAVE 54%
 Savings based on annual newsstand price of \$64.90.

Mr./Mrs./Ms. _____ (Please Print)

Company _____

Address _____

City _____ State _____ Zip _____

☐ Payment enclosed. ☐ Bill me later.

4N443

Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. Your disks will be shipped upon payment. Basic annual subscription price is \$44.97.



PC MAGAZINE

GIVE A GIFT/SAVE 62%

Please send a gift subscription and 2-Disk Library to:

Mr./Mrs./Ms. _____ (Please print full name)

Company _____

Address _____

City _____ State _____ Zip _____

- For: ☐ 22 issues (one year) for \$29.97. Save 54%
☐ 44 issues (two years) for \$49.97. Save 62%
 Savings based on annual newsstand price of \$64.90.

Please send me the invoice and sign the gift card from:

Mr./Mrs./Ms. _____ (Please print full name)

Company _____

Address _____

City _____ State _____ Zip _____

Please add \$37 per year for postage outside USA, \$25 in Canada, US currency only. Allow up to 60 days for delivery of first issue. The disks will be shipped upon payment. Basic annual subscription price is \$44.97.





NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

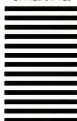
BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524
Boulder, Colorado 80321-1524



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524
Boulder, Colorado 80321-1524



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 51524
Boulder, Colorado 80321-1524



2 FREE

UTILITIES

DISKS

**Subscribe and
Save**

PC Magazine is the most powerful add-on to your IBM-standard system. Subscribe now and save 62% off the newsstand price.

DOUBLE

BONUS

Subscribe now and you'll add even more to your PC with the 2-Disk PC Magazine Utilities Library—Yours FREE with your paid subscription. You'll get both Vol. I and the all new Vol. II, packed with 78 ultra-powerful utilities to help you increase the speed and flexibility of your DOS system.

Share the power GIVE PC MAGAZINE

Give PC Magazine to a friend or business associate. We'll send an attractive gift card in your name, *plus* the 2 Free Disks. What a gift!





Get the Most Out of Us!

**Join PC MagNet and have instant access to
PC Magazine's utilities and editorial staff.**

PC MagNet is *PC Magazine's* on-line information service,
which is administered by CompuServe. \$12.50 per hour lets you:

- Download any of *PC Magazine's* utilities
 - Download files from the Forum data libraries
 - Talk to editors and columnists
 - Tell Dvorak and Zachmann how you really feel
 - Trade tips with Charles Petzold or Ray Duncan
 - Search for back articles on-line
- If you already have a CompuServe account, simply enter **GO PCMAGNET** at the ! prompt

ONE CALL GETS YOU STARTED!

Sign up on-line at no additional charge.

1. To subscribe, set your modem to: 300 or 1,200 bps, 7 data bits, even parity, 1 stop bit and full duplex. Call one of the numbers listed:

Anaheim, CA.....(714) 520-9724
Atlanta, GA.....(404) 266-7014
Baltimore, MD.....(301) 254-7113
Boston, MA.....(617) 542-1796
Chicago, IL.....(312) 693-0330
Cleveland, OH.....(216) 771-6860
Dallas, TX.....(214) 953-0212
Detroit, MI.....(313) 255-9207
Houston, TX.....(713) 462-0202
Los Angeles, CA.....(213) 739-8906
Miami, FL.....(305) 266-0231

Minneapolis, MN.....(612) 342-2207
New York, NY.....(212) 422-8820
Newark, NJ.....(201) 624-6565
Philadelphia, PA.....(215) 977-9798
Pittsburgh, PA.....(412) 391-7732
San Diego, CA.....(619) 283-6091
San Francisco, CA.....(415) 956-4191
Seattle, WA.....(206) 241-9111
St. Louis, MO.....(314) 241-3102
Washington, DC.....(202) 388-4280

(Note: After you have become a member, you can locate a local telephone access number, or 2,400-bps service, by typing **GO PHONES** at the ! prompt.)

2. When you receive a Connect or Carrier Detected message, enter **Ctrl-C**.
3. At the **HOST NAME** prompt, enter **CIS**.

4. At the **USER ID** prompt, enter **177000, 5000**.

5. At the **PASSWORD** prompt, enter **PC*MAGNET**.

6. At the **Enter agreement number** prompt, enter **Z1006907**.

7. Register your name and enter your **VISA, MasterCard, or American Express** account number.

8. Your personal **User ID** number and **Password** will be displayed at the end of the subscription process. Please record them in a secure place.

9. A new password will arrive in the mail within 10 days to confirm your subscription.

There are no connect charges for PC MagNet during the subscription process.



[illegible]

(LASER) ST. ASM (continued)

To Choose The Right Computer, You Have To Look A Little Deeper.

The 32-bit interleaved memory card provides faster processing speed and comes standard with 2 megabytes of RAM.

Additional parallel/serial ports can be located in the chassis.

Our special PC1386 socket includes a perfectly sized screwdriver allowing easy opening and closing of the case without damaging the screws.

Power supply is UL approved.

All eight I/O slots on the System Bus board are 100% AT compatible, and four are 32-bit.

These features apply to our AMAX PC 386.

The Intel 80386 based PC1386 features a replaceable 32-bit CPU card, which gives you complete upgrade capabilities.

Speaker volume control is front-mounted, and user adjustable, allowing you to quickly adapt your AMAX PC1386 to any working environment.

The convenient front-mounted on-off switch provides easy access, which means you can rack the PC into a corner of your desktop and save space.

The five standard half-height disk drive slots allow for additional disk drives, tape backups, and hard disks as your needs grow.

These days it seems a lot of PC makers would rather show you a beautiful outside than reveal what's behind it. But at AMAX, we're so proud of our line of high performance, IBM*-compatible PCs that we want the world to see exactly what makes them the best in the business, inside and out.

Of course, building a truly dependable computer requires more than quality materials and quality fabrication. It also takes a commitment to quality control, and that's where we're

All run at O-Wait States

at our best. Before an AMAX PC leaves the plant, all systems and components undergo rigorous testing and evaluation including an extended "burn-in" period at temperatures ranging from 110° to 130°F. And our commitment continues after the sale, with long-term technical phone support, quick turnaround service and a 12-month limited warranty.

Scratch the surface a little deeper, and you'll find that AMAX PCs run all PC and MS-DOS compatible software with ease. And that our architecture meets or exceeds industry standards for PC compatibles. And speaking of scratches, we certainly don't neglect our sleek exteriors, either. If there's so much as a single blemish on an AMAX chassis, it's immediately rejected.

Finally, you won't have to dig a little deeper to pay for it all, because our price/performance ratio makes AMAX an eminently affordable buy. For a dealer near you, call us today at 800-888-2629, ext. 386. Once you look into AMAX, we think you're going to like what you see.

AMAX


We're Building A Computer You Can Live With.



IBM is a registered trademark of International Business Machines Corporation.

AMAX Engineering Corp., 47315 Mission Falls Court, Fremont, CA 94539

CIRCLE 179 ON READER SERVICE CARD



**Make your
point without
a trace of
doubt.**

**With the new
HIPAD PLUS
series.**

If you've ever used a digitizer, you probably were surprised that it didn't do what you thought it would. You assumed that whatever you picked or moved or drew on the tablet would be accurately displayed on the screen and precisely reflected on output. In spite of its straight-forward appearance, it didn't take you long to learn that all digitizers were not created equal, or accurate, or even easy to use.

Today there's a new line of digitizers that can meet your expectations. It's the new HIPAD Plus™ series. With sizes ranging from a compact 12" x 12" to a drafting-size 44" x 60", each model reflects HI's tradition of price/performance excellence.

Compare, for example, the sleek 9012 and 9018 models (shown below) which contain HI's exclusive tilt-correction feature. This unique feature lets you use the stylus like a pencil—no need to hold it in an awkward perpendicular position. HI's tablet captures only the points touched by the tip of the stylus, so you can make menu selections, create freehand drawings, move the screen cursor, or edit pixel-by-pixel—without a trace of doubt.

If you prefer a handheld cursor, you'll find HI's new four-button cursor has the same pin-point precision. (You'll also like the way it feels in your hand.)

The HIPAD Plus digitizers are compatible with both your CAD and graphics systems. Each model processes coordinates rapidly (up to 200 pairs per second) and has a resolution of up to 2,540 lines per inch. This all adds up to high performance and accuracy—and it means you won't be replacing your tablet to meet the high-resolution demands of the future.

And, with prices like \$495* for the 12" x 12" tablet and \$795* for the 12" x 18" tablet, HIPAD Plus is affordable. Make your point without a trace of doubt. For details, call 1-800-444-3425 or 512-835-0900.

**HOUSTON
INSTRUMENT**
A DIVISION OF **AMETEK**

8500 Cameron Road, Austin, TX 78753

CIRCLE 117 ON READER SERVICE CARD

*U.S. suggested retail prices. HIPAD Plus and Houston Instrument are trademarks of AMETEK, Inc.

(LASER) ST. ASM (end)

STA

PC MAGAZINE ■ APRIL 11, 1989

Heaven forbid we should offend anyone. But it's a fact of life that you can't save every magazine you read.

Here's another fact. As soon as you throw something away, you discover you need it. In which case, get on your modem

tions going back to early 1987. You can zero in on any one of thousands of reviews, articles, case histories or

Throw this m

and dial up *Computer Database Plus*.

Computer Database Plus lets you access every issue of 125 major computer publica-

abstracts. With as little to go on as a key word.

Almost before you can say "laser printer," for example, you've tracked down that crucial product review.

Even if the article you want has just hit the stands, you're in luck. *Computer Database Plus* is updated with almost 5,000 abstracts and articles each month from current publications.

And with *Computer Database Plus*, you don't throw money away. You can print out the abstract or full article for as little as \$3.50. Or you can jot down the article title, issue and date, if that's all you need, for even less.

So even if you can't save every computer magazine

supplier of information databases.

Start using *Computer Database Plus* right away on CompuServe or PC MagNet.

agazine away.

you read, you're saved.

Just remember *Computer Database Plus*.

From Information Access Company, the leading

Just type GO COMPDB.

Or call 1-800-441-1165 for more information.

Introducing
**COMPUTER
DATABASE PLUS™**
*The on-line library of computer
publications.*

Computer Database Plus is a trademark of Information Access Company.

■ UTILITIES

is used to print listings of program files, "readme" files, and the like, so the lack of word-wrap provisions is immaterial. LASERLST won't choke on lines longer than 81 characters; they just won't look as nice as you'd like.

Third, the tab characters in the text file will be replaced with spaces in the print-out. If a tab is followed by one or more backspaces, each backspace will back up over only one of the tab-created spaces. Since LASERLST honors carriage-return and backspace codes individually, they can be used to overprint characters for such effects as underlining and strikeover.

HOW LASERLST WORKS The LASERLST program has three sections: command-line parsing, input-file I/O, and printer-state management. The code shown in LASERLST.ASM is heavily commented, so look there for details, but I'll touch on some of the highlights.

On entry, LASERLST checks the command-line parameters and simply aborts if they're bad. Next, it determines if the output file can be opened and whether any of the specified input files exist. If they do,

■ **LASERLST has three sections: command-line parsing, input-file I/O, and printer-state management.**

each file is opened and read and its contents are passed to the print routine. When the end of the current file is read, the output file is not closed, though the print rou-

tine is informed that the end of file was encountered. That way, the print routine can return to its initial state, ready to print page 1 of the next file. When the last file is finished, control is returned to DOS.

Before command-line parsing starts, the current drive and directory are saved so they can be restored before returning to DOS. Next, the first argument is searched to see if a drive or path was specified. If so, the current drive and directory are changed to it. The reason for the change is that the DOS FIND FIRST and FIND NEXT MATCHING FILE calls return only the name of the file found. In order to open the named file it is necessary either to note the directory passed on the command line and append each filename found to it or, more simply, to be in that directory, where you can open the file just by passing the filename.

Determining whether a drive was specified on the command line is as easy as



They can't mess with your data.

Plus Passport. The highest performance removable hard disk. With Passport, you can have all the performance of the best fixed hard disks: 20 or 40 MB of capacity. And an effective access time of 28 ms. Passport is

even two to three times more reliable. But you can take the entire hard disk out of your PC in seconds. And lock it up in a safe place.

How does Passport compare to cartridge-based removables? It holds twice as much data.

*For IBM PC/XT/AT class computers and IBM PS/2 Micro Channel Systems. **For details call 1-800-471-8088. Plus Development Corp. is a wholly owned subsidiary of Quantum Corp. Passport is a trademark and Plus is a registered trademark of Plus Development Corp. © 1989 Plus Development Corp.

checking to see if the second character is a colon (:). Determining the path specified is a little more difficult, since the path runs from the character after the drive (if specified) through the last backslash (\) found. A REPNE SCASB instruction is used, starting from the end of the parameter, with the CPU's direction flag off. This causes a right-to-left search. If the final backslash is found, it is replaced by an ASCII zero to be passed to the DOS CHANGE CURRENT DIRECTORY call.

An interesting point to note in passing is that DOS will not open a file whose name ends in a colon, as would a user-supplied *outfile* of LPT2:. LASERLST fixes this by noting the colon at the end of the file specification and changing it to a null.

The input file processing is rather unremarkable except for one minor point. The DOS FIND FIRST function, which finds the first matching file to print, is used at

initialization time and serves the dual purpose of initializing the FIND FIRST/FIND NEXT process and of determining if there are any files to print. The FIND NEXT is then performed directly after the close of

■ The real meat of LASERLST is in its print routine, which maintains the current state of the printer.

each file, determining whether there are any more files to process.

The real meat of LASERLST is in its print routine. This routine maintains the

current state of the printer, which includes the "printhead" position, the line currently being printed, and which side of the page is being composed. As each buffer of the file is read, it is passed to the PRINT routine. If it's the first buffer of a file, the initialization code in the routine PROLOGUE is executed, which writes an initialization string to the output file and initializes the print-routine state.

Any tabs in the buffer are then expanded into an appropriate number of spaces. Oddly enough, this is what accounts for the program's maximum memory requirement. Since LASERLST completely expands each 2K buffer read and the maximum tab width is 16, if someone were to pass LASERLST 2K worth of tab characters with /T16 specified, it would require 32K to expand it to blank spaces. The program itself requires about 4K between its .COM size and the uninitialized data area. Added to the 32K for an all-tabs buffer,

If your data isn't there.

It's much faster. It doesn't wear out. And it doesn't need head cleaning or regular preventive maintenance. So you get all the security of a removable. And none of the drawbacks.

If you'd like to know more, we'll send you

a free applications guide, complete with technical details. And show you the only practical way to keep private data private. Just call us at 1-800-624-5545."

Plus 

Voice Mail Card

PRODUCTIVITY

UTILITIES

INTRODUCING THE NEW VOICE MAIL CARD

IT TURNS ANY PC INTO A POWERFUL VOICE MAIL SYSTEM

IT'S A FULL FUNCTION VOICE MAIL SYSTEM

The Voice Mail Card gives you individual private voice mail boxes, each coded by a password. It takes messages and forwards messages to other phones, just like a private receptionist. And of course you can retrieve messages remotely from any touch-tone phone.

IT RECORDS DIGITALLY

like the most expensive voice mail systems. The Voice Mail Card records right on your hard disk. You'll be amazed at the clarity of reproduction.

A WHOLE LOT OF APPLICATION IS YOURS
Tailor it to your own specific needs. Ideal for mail order, telemarketing, university voice mail system, and a lot, lot more!

IT REALLY IS AFFORDABLE

Lots of application for less money. It has a simple price tag, starting from \$150. Get the right one to work for you now! All you need is an MS-DOS PC, a hard disk and a lot of incoming calls.



FLOPPY DISK DRIVES

5.25" 360 KB Drive for PCs/XTs...	\$ 65
5.25" 1.2 MB Drive for ATs...	\$ 75
5.25" 360 KB External Drive for PS/2...	\$179
5.25" 1.2 MB External Drive for PS/2...	\$219
5.25" Drive for Apple II+ (114)...	\$ 79
5.25" Drive for Apple IIc/IIgs...	\$ 88
5.25" Drive for PC Transporter...	\$168
5.25" External Drive for Toshiba lap top...	\$200
3.5" 720 KB Drive with 5 1/4" mounting kit...	\$ 85
3.5" 1.44 MB Drive with 5 1/4" mounting kit...	\$ 99
3.5" 880 KB External Drive for Amiga...	\$189
3.5" 800 KB External Drive for Apple IIgs...	\$185

We also carry top brand software for Integrated, Spreadsheet, Graphics, Database, and Accounting applications at a low, low price.

CALL US TODAY TO FIND OUT MORE!

TOLL FREE ORDER LINES

Inside NY 1-800-553-6224

Outside NY 1-800-433-6224

For more information, call

KINSON PRODUCTS CORP.

482-484 Sunrise Highway
Rockville Centre, NY 11570
Tel. (516) 763-0906

CIRCLE 193 ON READER SERVICE CARD

Compact Disk Products, Inc.

CD-ROM/WORM

ALL PRODUCTS, LOWEST PRICES, EXPERT ADVICE

INTRODUCTORY OFFERS

Introduce yourself to CD-ROM drives with your choice of:

McGraw-Hill Science and Technical Reference Set	\$999
Grollier Electronic Encyclopedia	\$620
Microsoft Bookshelf on PC/SG Library (Add \$200)	\$895
	\$495

SELECT CD-ROM SOFTWARE

Oxford English Dictionary	\$945
Comstock Stock Photography On CD	\$425
Edupack Plus: Encyclopaedia for the Mac	\$179
The New Grollier Electronic Encyclopedia	\$399
McGraw-Hill on Bookshelf (Add \$25 for McGraw-Hill)	\$495
The Bible Library	\$195
Kirk-Othmer Encyclopedia of Chemical Technology	\$845
Registry of Mass Spectral Data	\$2695
Geonova U.S. Atlas and Mapmaker	\$795

TOLL FREE ORDER LINE • 800-MEGABYTE (634-2298)

CD-ROM and WORM DRIVES

Hitachi 1500S External CD-ROM Drive with Audio	\$759
1500S with Digital Audio Output and CD-Capture	\$829
Hitachi 3500S Internal 1/2 Height CD-ROM Drive w/Audio	\$719
NEC Intersect CD-ROM Drives for the Apple/Mac	CALL
Maxtor 800 MB WORM Drive	\$399
Portable 286 with CD-ROM Drive and Hard Disk	CALL

CD-Play (\$99) Pop-up utility that permits user to play all audio CDs on Hitachi and compatible drives. Substitutes for headphones or amplifier.

CD-AudioFile (\$149) Automatically creates database records of all your audio CDs. Allows you to store a preferred play sequence for each disk. Automatic recognition of CDs. Creates library computer records.

CDP

Compact Disk Products
203 E. 95th St.
New York, NY 10009
Tel. (212) 737-8400
Fax (212) 33-8100
Computerv 755-30234

Consulting Services Now Available

INTERNATIONAL OFFICES A SPECIALTY

United Kingdom	Australia
Canada - New Market Firm	Canada - New Market Firm
Windsor Lake, Ontario	Windsor Lake, Ontario
Mail: 900-530-5300	Mail: 900-530-5300
Tel. 900-530-5300	Tel. 900-530-5300

CIRCLE 361 ON READER SERVICE CARD

DEALERS ONLY CIRCLE 523 ON READER SERVICE CARD

this yields a 36K memory requirement. Figure 2 shows the memory layout at runtime.

After the tab expansion, each character is examined to see whether it will have a special impact on the printout. The special characters noted are carriage return, line feed, form feed, backspace, and character 82, on any given line. In explaining how LASERLST handles these characters, I'll use the conventional terms "printhead" and "paper movement." While there is no actual printhead in a laser printer, it's still the best term to use in describing how the program regards the position in the current line. Similarly, paper movement accurately describes how the LASERLST program regards moving "down" each page as it is printed.

A carriage return causes the printhead to move to the first character on the current line. No paper movement is caused by a carriage return.

The line feed causes the paper to move up a line, but does not cause the printhead to move. Thus, for example, if the printhead is at column 10 on line 3 when a line feed is encountered, the next character will be printed in column 10 of line 4. This is important because it also means that only 71 characters will be available on line 4 before the line wraps.

A form-feed character causes the print-

PC LASERLST Memory Map

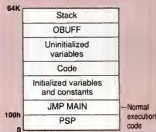


Figure 2: With this memory layout, only the memory that starts at the first byte of the JMP MAIN (100h) instruction and the end of the code area must be saved in the LASER ST.COM file.

■ PC MAGAZINE'S FREE UTILITY: A SUMMARY

LASERLST BY MODEM

The programs published in *PC Magazine* are available by modem from PC MagNet, an on-line information service administered by CompuServe.

To download LASERLST.COM, log on to PC MagNet. Enter GO UTILITIES or choose PC MAGAZINE UTILITIES from the top menu, then DIRECT UTILITY DOWNLOAD from the next. Enter the filename, then select the file from those presented. Answer (Y) to DO YOU WISH TO DOWNLOAD? Press Enter to see the transfer protocols. Choose a protocol and download the file.

To join PC MagNet, set your communications software for either 300 or 1,200 bits per second, 7 data bits, even parity, 1 stop bit, and full duplex. You can use any of more than 300 local access phone numbers, including: Boston, (617) 542-1796; New York, (212) 422-8820; Chicago, (312) 693-0330; or San Francisco, (415) 956-4191. To find the number nearest your dialing exchange after you have subscribed, or for 2,400-bps service, connect with PC MagNet and type GO PHONES. For Customer Service, call (800) 848-8990; in Ohio and outside the United States, call (614) 457-8650.

When you connect with PC MagNet, press Ctrl-C. At the HOST NAME PROMPT, enter C1S. At the USER ID prompt, enter 177000.5000. Enter PC*MAGNET at the PASSWORD prompt and Z10D8907 at the ENTER AGREEMENT NUMBER prompt.

PC MagNet costs \$12.50 per hour for 1,200/2,400-bps service and \$6 for 300-bps, via MasterCard, VISA, or American Express. There is no additional charge for downloading source code or compiled programs from PC MagNet. These programs can be copied but are copyrighted and are made available only for noncommercial use. You may make copies for others as long as no charge is involved, but making copies for any commercial purpose is strictly prohibited.

Tear out and hole-punch the command summary on this page and add it to your DOS manual.

LASERLST
Command

Michael Holmes and Bob Flanders

April 11, 1989 (Utilities)

Purpose:	Formats text files so that the information of two standard-sized pages is printed side by side on a single landscape-mode page when printed with an HP LaserJet (or compatible) laser printer.
Format:	[d:] [path] LASERLST <i>infile</i> [<i>outfile</i>] [/Tn]
Remarks:	The <i>infile</i> parameter designates the text file(s) to be printed. DOS "wildcards" (*) and (?) can be used to designate multiple files, and a drive and path may also be included as part of <i>infile</i> .

By default, LASERLST sends its output to the standard DOS printing device, which is normally LPT1:. The optional *outfile* parameter can be used to direct the output either to another DOS device (LPT2:, for example), or to a disk file instead. The optional /Tn switch causes each tab character (ASCII 9) in the *infile* to be replaced in the *outfile* with *n* spaces. The default value of *n* is 8; other values up to 16 may be used.

The *outfile* produced by LASERLST contains the requisite formatting and printing escape sequences used by the HP LaserJet printers. The *infile* is printed in landscape mode with two 66-line by 81-character pages on each physical page. Files suitable for processing by LASERLST should be ASCII files that do not contain escape sequences of their own and do not require any specific word processor's formatting codes. LASERLST does, however, support underlining produced by a backspace and character strikeover. LASERLST may be used with files whose line lengths exceed 81 characters, but lines will be wrapped automatically at their 82nd character, and no provision is made for word wrap. LASERLST is especially suitable for printing program listings, README files, and rough drafts of text to be edited.

Available for downloading from PC MagNet (see the sidebar "LASERLST by Modem"), LASERLST.COM is already compiled and ready to run. Alternatively, LASERLST.COM can be created from either of two program files, both printed in the article and available for downloading from PC MagNet. LASERLST.BAS will automatically create LASERLST.COM when you run it once in BASIC. Creating LASERLST.COM from the LASERLST.ASM source code requires the use of a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

```

MASM LASERLST;
LINK LASERLST;
EXE2BIN LASERLST LASERLST.COM;

```

PC EXCHANGE PROGRAMMER'S WORKBENCH

dBASE AT THE SPEED OF C

dbx Translates dBASE Applications to C

You dBASE™ programmers know what an expensive and formidable language dBASE is. It's a very comfortable development environment. But the price of a database performance. Even compiled dBASE doesn't offer the speed that some users require these days. The kind of speed offered by software written in the C language. The answer is dBASE™. dbx translates dBASE to C. It offers you a major competitive advantage over the next dBASE programmer. Keep writing in dBASE. Take every application all the way to completion. Then use dbx to translate them top to bottom to C!

Other advantages: C is portable, even to other operating systems like UNIX/Xenix™. To the Macintosh or Amiga dbx gives your applications a passport to places dBASE cannot go. Has its own file manager for single user, but links to major C file managers - c-type and dBC - for compatibility with dBASE files or multi-user support. We have everything you'll need, including good advice.

dbx with Library Source	Cost	Outs
Call for Full Source Pricing	\$250	\$419
	\$950	\$125

BRIEF/dBRIEF

The Power Environment for dBASE Programming

Many worthy utility products supply needs that dBASE's programming language doesn't - dUTIL™, dFLOW™ and a host of others. Trouble is, you have to use them separately, then combine their output into your dBASE program files.

No longer dBRIEF™ written in dBASE's macro language grabs hold of dBASE's runtime to create a complete dBASE III and III Plus programming domain. Using BRIEF's underlying shell capabilities and its own interfaces, dBRIEF can extend utility libraries like dBASE, dUTIL, and link to the Clipper™, Foxbase™ and dBase™ compilers, all with dBRIEF still loaded and running the show. It can do what dBRIEF already does plus:

- Convert a screen layout into dBASE code for interactive data entry.
- Display dBASE file structures in windows, a great convenience alongside your program files.
- Expand keystrokes into full dBASE statements.
- Insert automatically for clever display.
- Create databases under files, involve Action-File's dFORMAT™ and dCONVERT™ draw lines and boxes.
- Simply marvelous programming environment for writing and editing dBASE programs. PC Magazine, 7/85. Source code included!
- Requires BRIEF 1.32 or later and dBASE, 5.0B to run. dBASE with dBRIEF, 64K and harddisk recommended.

BRIEF/dBRIEF Last \$275 Outs call

FOXBASE +2.10

The Fastest, Most Powerful, dBASE Compatible Database Management System, NOW!

New FOXBASE +2.10 is faster, and more powerful than dBASE IV, and is available PC-W. FOXBASE +2.10 is already a PC Magazine Editor's Choice - and has received an unbelievable 9.2 rating from the industry! FOXBASE +2.10 has new features such as built in support for full down and pop-up menus, a new screen painter to create custom input screens, a new advanced automatic application generator to write programs for you automatically, a new user interface designed to allow both first time and experienced users to handle most database options effortlessly, and much, much more plus. Foxbase is just dBASE compatible and contains hundreds of dBASE.

enhancements. Run almost any dBASE program, with modification. Foxbase fully supports commands like Browse, Edit, Append, Create, Modify, Report, and Modify Label view in the middle of a running application! Foxbase supports IBM's network and local area networks.

	Cost	Outs
Foxbase + Version 2.10	\$395	\$542
Uninstall Runtime	\$500	\$333
Foxbase + Main User (LAI)	\$595	\$397
Uninstall Runtime	\$700	\$467
Foxbase + dBase	\$595	\$397
Uninstall Runtime	\$500	\$333
Foxbase + Macintosh	\$395	\$563
Uninstall Runtime	\$300	\$201

MICROSOFT LANGUAGES

Powerful Implementations Of The Most Popular Programming Languages

Microsoft C 5.0. The flagship of the Microsoft line runs up to 30 percent faster than its predecessor. Its new optimization features deliver unobtainable execution speeds, 100 new additional library routines.

Microsoft MacroASSEMBLER 5.0. If you ever wanted to take on the challenge of assembly, here's your opportunity. "MASM" 5.0 is a lot easier to use, has completely revised documentation, and a new "Mixed Language" programming guide that gives you step by step instructions for linking your assembly code with other Microsoft languages.

Microsoft QuickBASIC 4.0 is a revolu-

tionary concept in BASIC programming. It allows you to run, edit, debug, and run again. Our friends at Microsoft have eliminated the dreaded compile step. Whenever you edit your code QBA automatically incorporates your changes, so that it can run a program of 150,000 lines in less than a minute.

Each member of this language family includes the renowned debugger CODEVIEW.

	Cost	Outs
Microsoft C	\$490	\$295
Microsoft C Macro-ASSEMBLER	\$180	\$100
Microsoft QuickBASIC	\$ 99	\$ 66
Microsoft FORTRAN	\$450	\$295

NOVELL: BTRIEVE, XQL, XTREIVE

Sophisticated Tools Essential For Fast Database Handling

Btrieve is a library of subroutines that allows the programmer to build a database application using any language. It takes complete charge of all file creation, indexing, reading, writing, insertion, deletion, forward and backward searching. Its balanced tree indexing scheme finds any key in a million in less than 4 accesses. That's fast!

Btrieve is multi-lingual and it includes more than 20 database interfaces (including C, BASIC, PASCAL, FORTRAN). However if it turns out that you are using something a little unusual, worry not. The manual includes a chapter on how to write a language interface to Btrieve.

Btrieve's vital statistics are equally impressive. Files may have up to 24 indexes, fixed record length to 4,096 characters, variable length to 64K, indexes to 255 characters, files of 4 billion bytes. Network support includes Novell, 3-COM, IBM PC NET, Software Link's Multitask and many others.

XQL is a relational database management system designed especially for programmers. Imagine being able to access your database with the ease of SQL (Structured Query Language) statements and still having the power to process that data right down to the byte level.

Think about your applications. A large part of your software development effort is probably devoted to managing data stored in files on disk. Hours spent writing lines of code to search and store data

records could have been used to program more important parts of your application. Why not let XQL do it for you? XQL will increase your programming productivity and let you focus on building better applications.

The XQL system works in tandem with Btrieve and has an equally powerful choice. No limit on the number of records per file. Most file size is 4 gigabytes. Max record size equals 4K. Most indexes per file is 24. The one version works for single or multiuser systems. DOS Ver 3.0 or greater. All languages are supported.

Xtrieve is the final ingredient in the Novell programming recipe. It is a menu driven, data retrieval system that allows you to quickly find information and display reports. System developers can easily customize Xtrieve to display command menus, help files, and error messages in the English spoken by the customer. Xtrieve screens then gives menu choices that users can quickly memorize, making Xtrieve an easy product to use and understand.

Report Option for printing customized reports, form letters, mailing labels & statements.

	Cost	Outs
Btrieve	\$245	\$175
Btrieve/N	\$395	\$445
XQL	\$795	\$995
Xtrieve	\$345	\$325
Xtrieve/N	\$395	\$400
Report Option	\$145	\$128
Report Option/N	\$345	\$289

GSS GRAPHICS SYSTEM

Leave the Device Driving to GSS

For serious applications stick to the tools that stick to the standards. Not the least of reasons why GSS™ has emerged as the pre-eminent graphics toolmaker is that it has always conformed to ANSI standards.

At the heart of the system is the CGI standard Development Toolkit. It has all language interfaces and device drivers for keyboards, mice, printers, tablets, plotters, pinballs, cameras. The drivers completely insulate your applications from concern for device idiosyncrasies. GSS Kernel™ conforms to ANSI's CGS

2b and has all its drivers and language bindings. Macro level tools to draw, color, segment, transform, store and recreate an object. The Metafile Interpreter reads ANSI COM files with full CGI capability for recreation on various devices.

Quality software? IBM thinks so. They sell GSS under their own label. Royalties. Needs 286. Cost.

CGI Development Toolkit \$495 \$375

Kernel System \$495 \$375

Kernel for IBM RT \$795 \$645

Metafile Interpreter \$295 \$235

CLIPPER \$449

R&R RELATIONAL REPORT WRITER \$129

MORE PROGRAMMING TOOLS FOR...

dBASE, C, FORTRAN, BASIC, COBOL, PASCAL

dbc ISAM, FoxBASE, Greenleaf, Halo '88, Logitech MODULA, MicroFocus COBOL, Norton Utilities, Panel Plus, Periscope, Phoenix, Polytron, RM/COBOL, Sprindrift, Tom Rettig's Library, Windows for Data...and many more.

Call or write for prices and information.

HANSON & CONNORS

PC EXCHANGE™

1-800-DIAL-PCX

30 DAY MONEY BACK GUARANTEE

OVERNIGHT SOFTWARE DELIVERY
Formerly PC EXPRESS



(That's 1-800-342-5729)
All prices subject to change.
Delivery subject to availability.

7 ZEL PLAZA
SPRING VALLEY, NY
10977

PHONE: (914) 426-3400
FAX: (914) 426-2600
TELEX: 667962 (SOFT COMM NYK)

CIRCLE 395 ON READER SERVICE CARD

■ UTILITIES

er to go to the start of the next page. This character is not directly sent to the printer, however, but is intercepted so that the program can shift the printhead from an odd-numbered page to an even-numbered page without causing the printer to print and eject the sheet. Only when a form feed (or end of page) is encountered on an even-numbered page is an actual form-feed character sent to the printer to signal the start of the next physical page. It's interesting to note that, whether maintained in ASCII or binary, the last bit in the page number can be tested to determine which side of the page is being completed.

The only other character interpreted by the program is the printable character that would occupy the 82nd position in the line. Any such character causes a carriage return—line feed sequence to be output before the character itself, creating a line wrap.

The backspace character moves the printhead one character to the left, causing an overprint of the previous character.

When the end of file is encountered, PRINT is called with a parameter that tells it there is no more data. At this point, the EPILOGUE routine is called to finish printing the current file and reset the printer routine to its initial state for the start of the next file, if one is found.

LASER PRINTER INTERFACE Although the output may be saved as a DOS file, the ultimate target, of course, is the laser printer. LASERLST must embed the proper codes—escape sequences—in the *outfile* to tell the printer how to print the data. There are several rules that govern how the printer regards those sequences.

First, the printer looks for the ESCAPE character (27 decimal, 01B hex) as the start of any commands directed to it. With a versatile printer such as the HP LaserJet, escape sequences can command a wide range of actions. The commands used by LASERLST are explained in Figure 3.

The specific characters that follow the ESCAPE tell the printer which functions to perform, of course. You will note that each sequence ends in a capital letter. This is because Hewlett-Packard's printer language permits several commands to be combined in a single string. In the sequence

`sa0r90m88L`



Laser Printer Command Strings

&I0	This string puts the printer in <i>landscape</i> mode, which causes it to print across the 11-inch length of the page rather than the 8½-inch width. The normal mode is known as <i>portrait</i> mode.
E	The ESC E sequence causes the printer to be reset to its power-up setup values. This sequence is sent at the beginning and end of each file printed.
(s17H	This sets the <i>font pitch</i> to 17 characters per inch, which permits a full 162 characters to be printed with enough left over for the border and separator lines.
&15.14C	This escape sequence sets the <i>vertical motion index</i> , the amount of space the printer puts between the top of one line and the top of the next. The value 5.14 is the number of 1/48-inch increments to be used for each line. This translates into .1071 inch per line or 79 lines per page.
&171F	This sets the <i>text length</i> , the maximum number of lines that may be printed before the printer will automatically eject the current page. In LASERLST, the page is not ejected, because the program relocates the cursor before the end of page is encountered.
&16E	This sets the <i>top margin</i> , the area above the title line.
(s-3B	This sets the <i>stroke weight</i> , which tells the printer how bold the characters should be.
&a0R	This command causes the next position on the page to be the top printable line on the page.
&a5L &a88L &a91L	These commands tell the printer where to put the left margin. It is set to 5 during the left-hand page print, to 88 for printing the separator bar, and to 91 during the right-hand page print.
&a85M &a90M &a171M	These commands tell the printer where to put the right margin. It is set to 85 during left-side print, to 90 while printing the vertical bar, and to 171 during right-hand print. Note that the right margin set always occurs before the left margin set because the printer will not allow the left margin to be set beyond the right margin.
&dD	This command turns on underline mode.
&d@	This command turns off underline mode.

Figure 3: The command strings used by LASERLST. Each string begins with the escape character, but only the characters following the escape are shown.

there are actually three commands. When lowercase letters are used (for instance the *r* and *m* in the above string), the printer knows that another command sequence immediately follows. While this is clearly noted in the technical documentation for the printer, it may be overlooked when reading a program such as LASERLST, whose command sequences are simple and broken up.

While it is not very useful for those with

dot matrix printers, if you have access to a laser printer, you'll find LASERLST to be a reasonably speedy program that prints certain types of files in a very readable format. And just think of the trees you'll save. ☐

Michael Holmes is vice-president and senior systems analyst and Bob Flanders is president and senior systems analyst at NCI Systems Inc. in Annandale, Virginia.

Before
you buy a printer,
get a second
opinion.

"The Quickwriter is a 24-pin printer built to run forever, very quickly."

Recently, in *PC Magazine's* Fifth Annual Printer Issue, the editors gave our IBM Quickwriter their prestigious Editor's Choice Award.

The competition was stiff and the testing demanding. In selecting the Quickwriter as the *crème de la crème* of its class, the knowledgeable lab experts at *PC Magazine* scrutinized printers of virtually every brand name, with every speed, and at every price range.

It was under these conditions, and in a very tough category, that the Quickwriter came out of the pack with flying colors:

"...IBM has hit on a winner..."

When they chose the Quickwriter as number one, they considered the look of its crisp executive type and the quality of its graphics, with either film or fabric ribbon, and this is how they described what they were looking at:

"It's gorgeous."

When they examined our Quickwriter for design, durability, speed and ease of use, they used some very impressive language:

"IBM designed this obviously heavy-duty device to run without fail for a very long time."

And when they saw that our Quickwriter was the fastest IBM impact personal printer ever, that it was the only one that could go from letterhead to envelopes

automatically, in seconds, and that it could do multi-part forms and spreadsheets beautifully, they simply concluded:

"...this is a printer without peer."

To see the IBM Quickwriter in action, see your IBM Authorized Dealer or your IBM marketing representative today.

For a copy of the complete *PC Magazine* review, or to find the dealer nearest you, call 1 800 IBM-2468, ext. 118. And put your money on a winner.



IBM®

GIVE US HALF AN HOUR AND \$299 AND WE'LL GUARANTEE YOU A FULL FEATURED NETWORK.

THAT'S ALL it takes to turn two IBM or compatible PCs into a true network. Half an hour or less to install MainLan and \$299 for MainLan's complete starter pack.

And if you want to add 1, 2 or more, it's just a matter of \$199 for each additional computer.

An inexpensive way to turn your fragmented, unsociable collection of computers into a fully functioning network, sharing printers, making files, data and hard disks available to anyone who needs them, giving you electronic mail and the comfort of security.



The MainLan Starter Pack—everything you need to connect two computers, including two network boards, software, documentation, and two 16.5' shielded cables with terminating plugs. The Extension Pack contains the network board, and one cable and plug set.

FRIENDLY LAN

MainLan's menu system lets you spend your time working instead of learning how to make it work. To transfer or manipulate files, redirect printer output, or send E-mail, just press the appropriate key. You can be a full-fledged member of the network while using as little as 50k. All this at a transmission rate of 4 Mbps.

LAUDABLE LAN

Don't just take our word on it. "PC WORLD" in England says "MainLan is a revolutionary way of operating in a multiple machine environment without having to make all of the usual sacrifices. It has the potential to be the low-cost networking standard of the future." The kind of features that earned



MainLan the PC MAGAZINE EDITOR'S AWARD at the 1988 British Personal Computer Awards. That's MainLan.

COMPATIBLE LAN

Because MainLan is NETBIOS compatible, you can run most of the popular multiuser NETBIOS compatible applications programs without modifications. Supports file and record locking.

THRIFTY LAN

MainLan is easy on your pocketbook, too. Our unique hardware design costs less to produce—and you enjoy the savings. You'll also enjoy not having to own an expensive network server.

THE FEATURES

- ▶ NETBIOS compatible
- ▶ 4 Megabits per second transmission rate
- ▶ Needs as little as 50k RAM
- ▶ Printer Sharing
- ▶ Hard Disk Sharing (Virtual Drive)
- ▶ 90 days free support

THE GUARANTEE

It's simple. Try MainLan at our special introductory offer of \$299 for the 2-PC Starter Pack (regularly \$399), and if it's not what you want in a LAN, return it within 30 days and we'll return your money. The MainLan Extension Pack for one PC is \$199. Limit of one Starter Pack per customer site, please.

US Sage, Inc. Department CJ1
2005 Tree Fork Lane, Suite 125
Longwood, FL 32750
(407) 331-4400 FAX (407) 331-4406

MainLan™
LOCAL AREA NETWORK

CALL TO ORDER
800-999-6770

IBM is a registered trademark of International Business Machines Corp.

Yes, I want to see what MainLan's full-featured LAN will do for me. I understand that I may return it anytime within 30 days, for a full refund if I am not completely satisfied.

1 Starter Pack.....\$299.00 + \$10 Shipping & Handling*
Extension Pack(s).....\$199.00 + \$10 Each Shipping & Handling*
TOTAL**.....\$

*Shipping via UPS Blue **Florida residents add 6% sales tax

Payment may be by Visa, MasterCard, money orders, cashiers check, or C.O.D.s. Purchase Orders (hardcopies only) are accepted from Fortune 1000 companies, and educational, medical, military and government installations. Please note method of payment below.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....STATE.....ZIP.....
TELEPHONE.....

Money Order or Cashiers Check.....C.O.D.....Visa.....MasterCard

Account Number.....Expiration Date.....

Signature.....

■ ENVIRONMENTS ■ CHARLES PETZOLD

HOW TO MOVE THE TIMELINE WINDOW



Continuing to explore ways of using nonstandard windows in Presentation Manager programs, we'll see how easily you can add your own moving logic to TIMELINE.

In the last issue, I presented a somewhat unusual Presentation Manager program called **TIMELINE**, which displayed the date and time in the lower-left corner of the screen. The unusual thing about the program was that it omitted all the child windows normally found in PM programs. This let you see for yourself that the child windows—the title bar, system menu, and minimize/maximize buttons (as well as the sizing border displayed by the frame window)—are programmers' *options* rather than requirements.

Of course, the functionality of **TIMELINE** was consequently reduced. Without a sizing border or minimize/maximize buttons, **TIMELINE** cannot be resized or minimized. But since **TIMELINE** was designed as a fixed-size window, these features are not missed.

Playing with it myself, however, I decided that the absence of the title bar was a more-serious limitation. One of the purposes of the title bar is to allow a window to be moved around the screen. Lacking this, the **TIMELINE** window can't be moved. It just plunks itself down in the lower-left corner of the screen and refuses to budge. I suggested last time that **TIMELINE** could have included its own moving logic, even though it didn't. Some readers may have concluded that adding such a feature would be difficult.

Adding your own window-moving logic isn't really hard at all, however, and this column will show you how to do it. Moreover, the new version of **TIMELINE** will "remember" where it was last moved and automatically put itself there the next time

you run the program. So if you'd prefer that **TIMELINE** sit in the lower-right corner of the screen (for example), you need only move it there once.

WHAT THE TITLE BAR DOES Normally, when you create a standard window for a Presentation Manager program, you include the `FCF_TITLEBAR` identifier among the frame-creation flags. This causes the Presentation Manager to create a title bar across the top of the window. The title bar serves several functions.

First, the title bar displays the name or title of the program. Programs that work with files (such as word processors) often use a title bar to display the name of the file being edited.

Second, the title bar changes color to indicate whether its program is the "active" window or not. The active window always appears on top of the other windows, and it receives any keyboard input.

■ The new date program will "remember" where it was last moved and automatically put itself there the next time you run the program.

Third, as I indicated, the title bar is responsible for supporting the movement of windows around the screen. The easiest way to move a window is to press button 1 on the mouse while the mouse pointer is positioned over the title bar. A rectangular frame (the same size as the window and as wide as the program's border) is then displayed. You simply move this frame by moving the mouse and when you release the mouse button the window moves to the new position.

You can also move the window by using the keyboard. You can select Move from the system menu or simply press Alt-F7. Again the rectangular frame is displayed and you can move it with the cursor movement keys. Pressing Enter ends the move operation; pressing Esc aborts it. Indeed, if you wish, you can even combine the keyboard and mouse when moving a window.

Now normally, of course, a program shouldn't attempt to draw anything outside its own window, since in doing so it could interfere with other programs that are displaying something on their windows. Yet the rectangular frame used for moving the window seemingly breaks this rule.

You'll notice, though, that when the rectangular frame is displayed, all other parts of the screen are frozen and cannot be updated. (For example, if you run the **RANDRECT** program, from the November 29, 1988, *Environments* column, you'll see it stop when you begin a moving operation.) It is this characteristic that allows the frame to be displayed and erased while it is being moved without affecting

■ ENVIRONMENTS

```

/TIMELINE.SUB -- Substitute window procedure and new function for TIMELINE
(c) 1989, Stiff Communications Co.
PC Magazine + Charlie Tefenkl, November 1988
*/

BOL MoveWindow (HWND hwndFrame, POINT ptPosition, BOOL Keyboard)
{
    TRACKED t1 ;
    WinQueryWindowRect (hwndFrame, &t1.rectTrack) ;
    WinSetWindowPos (hwndFrame, HWND_DESKTOP, (POINT) t1.rectTrack, 0) ;

    t1.x = t1.rectTrack.x ;
    t1.y = t1.rectTrack.y ;
    t1.xborder = 1 ;
    t1.yborder = 1 ;
    t1.xkeypad = 0 ;
    t1.ykeypad = 0 ;
    t1.xtrack = 0 ;
    t1.ytrack = 0 ;

    t1.ptInTrackRect.x = 0 ;
    t1.ptInTrackRect.y = 0 ;
    t1.ptInTrackRect.x = t1.rectTrack.x - t1.rectTrack.xborder ;
    t1.ptInTrackRect.y = t1.rectTrack.y - t1.rectTrack.yborder ;

    t1.rectTrack.xborder = 0 ;
    t1.rectTrack.yborder = 0 ;
    t1.rectTrack.xkeypad = 0 ;
    t1.rectTrack.ykeypad = 0 ;
    t1.rectTrack.xtrack = 0 ;
    t1.rectTrack.ytrack = 0 ;

    if (WinTrackRect (hwndFrame, &t1))
    {
        ptPosition.x = t1.rectTrack.x ;
        ptPosition.y = t1.rectTrack.y ;
        return TRUE ;
    }
    return FALSE ;
}

MSGDEF ClientWndProc (HWND hwnd, UMSG msg, WPARAM wpl, LPARAM mpl)
{
    static CHAR szAppName[] = "TIMELINE" ;
    static CHAR szWindowName[] = "POSITION" ;
    static HWND hwndFrame ;
    static HMENU hMenu ;
    static POINT ptPosition ;
    static struct
    {
        HWND hwndFrame ;
        POINT ptPosition ;
        struct
        {
            HWND hwndFrame ;
            POINT ptPosition ;
        } ;
    } ;

    switch (msg)
    {
        case WM_CREATE :
            hwndFrame = WinCreateWindow (hwnd, szAppName, szWindowName,
                WS_OVERLAPPED, WS_VISIBLE, 0, 0, 0, 0, 0, 0, 0, 0) ;
            break ;
        case WM_DESTROY :
            DestroyWindow (hwndFrame) ;
            break ;
        case WM_MOVE :
            MoveWindow (hwndFrame, ptPosition, TRUE) ;
            break ;
        case WM_SIZE :
            ResizeWindow (hwndFrame, wpl, mpl) ;
            break ;
        case WM_CLOSE :
            DestroyWindow (hwndFrame) ;
            break ;
        case WM_KEYDOWN :
            KeyDown (hwndFrame, wpl, mpl) ;
            break ;
        case WM_KEYUP :
            KeyUp (hwndFrame, wpl, mpl) ;
            break ;
        case WM_MOUSEMOVE :
            MouseMove (hwndFrame, wpl, mpl) ;
            break ;
        case WM_LBUTTONDOWN :
            LeftButtonDown (hwndFrame, wpl, mpl) ;
            break ;
        case WM_LBUTTONUP :
            LeftButtonUp (hwndFrame, wpl, mpl) ;
            break ;
        case WM_RBUTTONDOWN :
            RightButtonDown (hwndFrame, wpl, mpl) ;
            break ;
        case WM_RBUTTONUP :
            RightButtonUp (hwndFrame, wpl, mpl) ;
            break ;
        case WM_MBUTTONDOWN :
            MiddleButtonDown (hwndFrame, wpl, mpl) ;
            break ;
        case WM_MBUTTONUP :
            MiddleButtonUp (hwndFrame, wpl, mpl) ;
            break ;
        case WM_XBUTTONDOWN :
            XButtonDown (hwndFrame, wpl, mpl) ;
            break ;
        case WM_XBUTTONUP :
            XButtonUp (hwndFrame, wpl, mpl) ;
            break ;
        case WM_CONTEXTMENU :
            ContextMenu (hwndFrame, wpl, mpl) ;
            break ;
        case WM_HELP :
            Help (hwndFrame, wpl, mpl) ;
            break ;
        case WM_USER :
            User (hwndFrame, wpl, mpl) ;
            break ;
        case WM_QUERYENDSESSION :
            QueryEndSession (hwndFrame, wpl, mpl) ;
            break ;
        case WM_QUIT :
            Quit (hwndFrame, wpl, mpl) ;
            break ;
        default :
            DefWindowProc (hwndFrame, msg, wpl, mpl) ;
    }
}

```

Figure 1: The two functions in *TIMELINE.SUB* replace the original *ClientWndProc* in last issue's *TIMELINE.C* to add the window-moving logic.

the windows of other programs.

Obviously, the title bar has access to a very powerful mechanism here. But it's nothing that you can't implement for yourself. It's a function called *WinTrackRect*. The title bar uses this function when you move a window, and the frame window uses *WinTrackRect* when you resize the window. Thus, *WinTrackRect* looks like the perfect solution for adding move logic to *TIMELINE*.

THE NEW TIMELINE Figure 1 shows a listing called *TIMELINE.SUB*. To create the new version of the *TIMELINE* program, you remove the *ClientWndProc* function from the *TIMELINE.C* listing presented in last issue's *Environments* column and substitute the two functions in *TIMELINE.SUB*. You can then use the same *TIMELINE* Make file and *TIMELINE.DEF* module definition file shown last time to recompile the program.

The new version of *TIMELINE* is movable. Just press mouse button 1 while the

mouse pointer is positioned over *TIMELINE*'s window and the rectangular frame will be displayed. Move it with the mouse to another part of the screen and release the mouse button.

There is also a keyboard interface. If

■ **WinTrackRect** freezes the window, displays the rectangular tracking frame, and allows it to be moved around the screen.

you don't have a mouse installed, bring up the Task Manager and select *TIMELINE* from the list of programs. This makes *TIMELINE* the active program and gives it the input focus. Now press Alt-F7 (the

same key combination used for moving other windows) and move the window with the cursor movement keys. Press Enter when you're finished or Esc to cancel the move operation.

The new version of *TIMELINE* contains a slightly longer *ClientWndProc* and has one additional function, named *MoveWindow*. This function is called from *ClientWndProc* during processing of the *WM_LBUTTONDOWN* message. Naturally enough, that's the message that tells a program when the first button on the mouse has been pressed. In response to a *WM_LBUTTONDOWN* message, *ClientWndProc* calls *WinSetActiveWindow* to make *TIMELINE* the active window and then calls *MoveWindow*.

THE WinTrackRect FUNCTION The main job of *MoveWindow* is to call *WinTrackRect*. The *WinTrackRect* function freezes the window, displays the rectangular tracking frame, and allows the frame to be moved around the screen. The

AND THEN
NORTHGATE
CREATED...

Elegance™





From top to bottom:
Elegance Model 1000,
20 and 25 MHz;
Elegance Model 2000,
20 and 25 MHz;
Elegance Model 3000
25MHz

The Dictionary Defines "ELEGANCE" as:
"Beauty of Style...Scientific Precision"

NORTHGATE Defines *Elegance*™ as

A Totally New Lineup of Five 80386-Class SuperMicro Computers *Redefining the Standards For Power Computing!*

**FASTEST 386 EVER!
UP TO 16 MEGABYTES OF
MEMORY. A 256KB READ/
WRITE-BACK CACHE. UP TO
1.2 GIGABYTES OF SCREAMING-
FAST HARD DRIVE STORAGE.
16-BIT VGA DISPLAYS. THE
OMNIKEY KEYBOARD
AND CABINETRY LIKE
YOU'VE NEVER SEEN BEFORE.
SIMPLY...**

Elegance™



PHONE NORTHGATE NOW FOR FULL DETAILS AND PRICING

NORTHGATE COMPUTER SYSTEMS, INC.

13895 Industrial Park Blvd., Suite 110
Plymouth, Minnesota 55441

From Foreign Countries call:
Corporate Headquarters (612) 553-0111 • FAX (612) 553-1695

*If you need the ultimate in pure computing power,
blended with every imaginable convenience and utility
feature, Northgate's all-new Elegance Series is for you—
AT PLEASINGLY (NOT SUSPICIOUSLY) LOW PRICES!*

■ **At the top of the line—the Elegance 3000.** It's housed in a deluxe floor-standing cabinet with space for 10—Yes 10—half-height storage devices, with a tinker-proof locking, full-length front door panel, 250-watt dual fan power supply with thermistor sensor to automatically control ventilation requirements.

Just try filling the drive slots. Northgate gives you both 1.2 and 1.44 floppies standard. Hard drive selection is up to you. From our 80MB SCSI with 17MS speed to dual 600MB SCSI or ESDI drives for a maximum capacity of 1.2 gigabytes. Plenty of space left over for more floppies, optical drive, tape backup, etc.

■ **Inside lives the lightning!** The 16 megabyte capacity motherboard is hyper-enhanced with 256 Kbytes of 30 nanosecond cache. But it's not just a read cache as with most systems. Our engineers have added a *write-back algorithm* that adds another boost to the already scorching processor power.

Re-calculations of even the biggest spread sheets are amazingly quick. Large databases are short work with Elegance. CAD drawings appear as fast as you can release the ENTER key.

And if you're tired of going out to lunch while a desktop publishing or graphics program struggles through your current system, *Elegance will put you on a diet!* The speed of these systems cannot be believed without experiencing it for yourself.

Northgate will custom configure your Elegance System to your own needs. Options include 16-Bit VGA displays, tape backups to 150MB, a huge range of hard drives, network software and hardware, laser printers...just call.

Yes, Elegance Systems are not for everyone. Northgate has a broad line of top performance systems to meet any computer need. Our 286 family includes our PC Magazine, *Editor's Choice* 286/12 and both 16 and 20MHz complete systems. Northgate's entry level 386 system is our 16MHz selling for just \$2699.

Whatever your computer needs, you're further ahead with Northgate. Backed by our unique **OVERNIGHT PARTS REPLACEMENT POLICY** and supported by the industry's most qualified technical support staff, Northgate is truly "The New Leader in State-Of-The-Art Power Computing."

**Elegance Systems prices for 20MHz complete systems start at \$4,699.
For 25MHz systems, prices start at \$5,299.**

1-800-548-1993

HOURS M-F 7am-8pm CST. Sat. 9am-3pm CST

New Canada Toll-Free Order Hotline: 1-800-338-8383



FINANCING: Use the Northgate "Big N" revolving credit card instead of tying up Visa or MC credit. Millions in financing available, easy to qualify for. Lease a Northgate with up to five-year terms. Ideal when cash flow is important. Phone for details.

For corporate and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-1591. Northgate, Elegance, and OmniKey are trademarks of Northgate Computer Systems, Inc. All other products are trademarks or registered trademarks of their respective companies.

■ ENVIRONMENTS

function returns when the user releases the mouse button or presses Enter or Esc.

A facility such as WinTrackRect must be versatile enough to be used for many purposes. As you can see from the listing, most of MoveWindow is devoted to setting up the fields of a TRACKINFO structure that is passed to the WinTrackRect function. This structure has 15 fields, including two that are POINTL (point) structures and two that are RECTL (rectangle) structures. Not all of them need be set for some uses of WinTrackRect.

The rcTrack field of the TRACKINFO structure is a RECTL structure that contains the initial size and position of the tracking rectangle relative to the lower-left corner of the screen. MoveWindow gets this information by calling WinQueryWindowRect, which returns the size and position of the frame window relative to the frame window's lower-left corner. It then translates this information into screen coordinates by calling WinMapWindowPoints. When WinTrackRect returns, the rcTrack structure contains the new size and position of the tracking rectangle.

The fs field of the TRACKINFO structure is a series of flags (encoded in a USHORT) that describe how WinTrackRect is to function. The most important flag in this case is TF_MOVE, which sets conditions so that the track rectangle retains the same size and can be moved around the screen.

The cxBorder and cyBorder fields of TRACKINFO contain the width of the rectangular frame that WinTrackRect draws. When you specify TF_STANDARD in the fs field, these dimensions are multiples of the standard border width. The cxKeyboard and cyKeyboard fields specify how many pixels the track rectangle moves for each cursor keypress.

The ptMinTrackSize and ptMaxTrackSize are really more important when you're using WinTrackRect for sizing rather than moving, but initializing them is still required.

The rcIBoundary field is another RECTL structure. It specifies the limits within which the tracking rectangle can be moved. For the modified TIMELINE, I've allowed movement anywhere on the screen. The TF_ALLBOUNDARY flag indicates that all of the tracking rectan-

gle is to remain inside this boundary.

WinTrackRect returns TRUE if the tracking operation ended normally and FALSE if it was canceled by the user with the Esc key. If WinTrackRect returns TRUE, MoveWindow returns the new lower-left corner of the rcTrack structure to ClientWndProc by setting the fields of a POINTL structure pointed to by pptPosition. If MoveWindow returns TRUE, then ClientWndProc uses WinSetWindowPos to set the window to the new position.

THE KEYBOARD INTERFACE Once this logic is in place, adding the keyboard interface (which uses the normal Alt-F7 key combination to initiate the move) is fairly simple. ClientWndProc processes WM_CHAR (keyboard) messages and checks if the key is a virtual key (that is, not a character key), if the Alt key is down,

■ You can set system colors from the Presentation Manager Control Panel program.

if the key is being released, and if the key is F7. If none of these conditions exist, then the WM_CHAR processing simply breaks. Otherwise, the WM_BUTTON1DOWN message is executed.

There is one noteworthy difference between initiating the move operation with the mouse and with the keyboard. You'll notice that ClientWndProc sets the last parameter to MoveWindow to TRUE if the move operation originated from the keyboard and to FALSE if it originated from the mouse. If this parameter is TRUE, MoveWindow includes the TF_SETPOINTERPOS flag in the fs field of the TRACKINFO structure.

During the WinTrackRect call, the mouse pointer stays in the same position relative to the tracking rectangle. If you initiate the tracking from the mouse, is already positioned over the window, which is fine. But if a mouse is installed and you initiate the window move via the key-

board, the mouse pointer might be in some other part of the screen. It would look odd to see it move when you move the track rectangle. The TF_SETPOINTERPOS flag causes WinTrackRect to move the mouse pointer to the center of the rectangle when the tracking begins.

THE OS2.INI FILE As you probably know, you can set system colors and other preferences from the Presentation Manager Control Panel program. The Control Panel stores the values you select in a file called OS2.INI. (The extension of this file stands for "initialization" and is usually pronounced to rhyme with *skinny*.)

The OS2.INI file can be used by any other Presentation Manager program that needs to store and retrieve configuration or initialization information. Several functions are provided for this purpose.

Each entry in the OS2.INI file is identified by an application name (generally the .EXE filename without the extension) and a key name, which the program uses to identify the data. An application can use multiple key names to store items.

TIMELINE uses this facility to store the new position of the window and retrieve it the next time the program is run. The application name is TIMELINE and the key name is POSITION.

After setting the new window position during the WM_BUTTON1DOWN message, TIMELINE calls WinWriteProfileData to store the POINTL structure containing this position. (You'll notice a disk access whenever you move the window. This is the Presentation Manager writing the information to OS2.INI.)

During the WM_CREATE message, the program calls WinQueryProfileData to read in the values. If WinQueryProfileData cannot find the entry (which will be the case the first time the program is run) then the function returns FALSE. Only if the function returns TRUE does TIMELINE use the POINTL structure to set an initial window position.

In the DOS world, the use of configuration files is usually restricted to large programs because they can add a lot of overhead to small utilities. But the facility built into the PM is so easy to use that even simple programs like TIMELINE can store configuration information. ☐

PC Magazine, Jan. 31, 1989, awarded Northgate's 286/12SM system its highly respected...

**EDITOR'S
CHOICE**



PC Magazine said:

"Speed by design: it's clear that Northgate Computer Systems values quality for the dollar with an emphasis on speed. The hardware and software components used in the Northgate 286/12 are chosen to give the most pep for the fewest dollars.

While the 286/12 is not the least-expensive fully configured system in this series, it simply gives more of everything."

THEN PC MAGAZINE CONCLUDED:

"If you want a system designed with performance and expansion as top priorities, consider this system seriously."



THE NORTHGATE PROMISE...

100% Customer Satisfaction!

That's the BEST reason Northgate's 286/12SM complete system deserves Your Choice as your next computer!

Unpack the carton, plug it together. Turn it on. The already formatted hard drive purrs. Up pops the C> prompt. Type DIR. **Zip.** Files fly by so fast you have to freeze the screen to read them.

Then you notice... 68 megs or more of RLL hard disk storage. No partitions either. Northgate gives you MS-DOS 4.01 with this system. Most others don't even include DOS. They charge extra. Including Dell.

Now...take it for a test drive. Load your programs. Finished so fast? Run 1-2-3. Try a re-calc. You hardly get your finger off the Enter key before it's done. *You don't know what fast is 'til you've run this baby.*

And the 286/12SM exudes quality. No cheap, old fashioned 12" monitor. Here's a high quality 14" graphics monitor, or even better, a true 16-bit (not 8-bit) VGA graphics monitor puts 256 colors on the screen. *Simply magnificent.*

More quality: Wait until you discover data entry with Northgate's exclusive OmniKey. Crisp, positive entry. With the F keys on the LEFT WHERE THEY BELONG!

You can't buy OmniKey anywhere but Northgate! And it comes standard with all our systems.

Uncertain about how to install a modem from another system? *Call Northgate.* For Tech Support by the most knowledgeable staff anywhere. *Top quality people who aren't satisfied until you are.*

Let's say something goes down—it does happen! Call Northgate. Immediate diagnosis over the phone. If a user-replaceable part is needed, it's on the way to you the day you call by overnight express. AND NORTHGATE PAYS THE FREIGHT. That's SERVICE!

Installation is a snap, and if you have questions, *Call Northgate.* We'll walk you through the fix so you're up and running again without waiting days for a "delivery kid" from one of those third party service companies.

Yes, you may pay a few dollars more for this system. But you know you're dealing in the Big Leagues with Northgate! *So if you're going to settle for less and buy at the lowest price, without concern for League Leading Performance, call the other guys!*

But if you want the 286/12 system that sets a new standard in the industry, backed by a company that just won't let you down, CALL NORTHGATE.

Complete System Price

\$2,199⁰⁰

Fully configured with 68 MB hard drive, 14" monitor, 1.2 MB and 1.44 MB floppy drives, OmniKey/102 keyboard AND MORE....



No lightweight this... full expansion capabilities, features and performance no other complete system can offer at the price



**NORTHGATE
COMPUTER
SYSTEMS, INC.**



PC
MAGAZINE

EDITOR'S
CHOICE

FACT FILE

Northgate 286/12
Northgate Computer System
(3895 Industrial Park Blvd., #10
Plymouth, MN 55441)
(800) 548-1993
(612) 553-0111

List Price: With 1MB RAM, 67MB hard disk, 1.2MB 5¼-inch or 1.44MB 3½-inch floppy drive, monochrome card and monitor, DOS 3.3, \$1,995; with VGA card and monitor, \$2,599

In Short: Northgate bundles high-performance systems. The competitively priced 286/12 combines hardware and software components to get the most from the 12-MHz AT-Level architecture

Other specifications and standard features that make this NORTHGATE "YOUR CHOICE":

- Processor—Intel 80286/12 (not a 10).
- Cabinet—Full size desktop case; control panel with system reset button, speed switch (8/12MHz), hard drive in-use light, 200-watt power supply.
- Hard Drive—Microscience 68MB, 28MS access time.
- Controller—16-bit, RLL, 1:1 Interleave for 800,000 BPS data transfer.
- Famed OmniKey/102 keyboard—pick of the pros.
- Floppies—One 1.2MB 5¼ inch; one 1.44MB 3½ inch.
- Monitor—14" flatscreen, amber or white, 1000 line resolution capability.
- Video Adapter—Hercules compatible with parallel port.
- Software—Northgate MS-DOS 4.01 with GWBasic, hardbound covers; PCQuick hard drive caching; Northgate System and DOS on-line user's guide; Northgate Utilities.

All systems are custom configured and manufactured at our production facility in Plymouth, Minnesota. Approximately 80 percent of parts used in Northgate systems are made in the U.S.A.

Hard drive is factory-formatted (we can do this legally because we are a DOS licensee) and system can be unpacked and ready for operations on site in about 10 minutes. Full instructions (written and printed in English) are provided.

SYSTEM OPTIONS:

Display—16-bit VGA Greyscale. Analog or Multisynch.

Hard Drives—Up to 600MB SCSI, ESDI, RLL (Northgate believes MFM drives are obsolete)

Let's talk differences and what makes Northgate a better value. Many systems have 1MB of RAM (including Dell, CompuAdd). BUT...only 640K is usable. The other 384K is "shadowed."

That means the system ROM and video ROM occupy the other 384K you paid for. Without your being able to use it! No RAMDISK! No Disk Caching! No Spoolers. And you can't use SmartDrive for Windows—want to see what S-L-O-W is try it.

Northgate performance is as good or better and gives you more for your money.

Northgate's proprietary motherboard—DESIGNED AND MADE IN THE U.S.A.—

gives you a full 1MB of usable RAM. So you can use 384K for your applications. And system performance is unaffected. Now compare prices!

The 286/12SM board has serial and parallel ports built in. The board has two 8-bit and four 16-bit slots. A special memory board slot we call "Lightning Alley" runs at processor speed—12MHz—not 6 or 8 MHz as do others. That's as much as 100% faster!

One megabyte of RAM can be installed on the motherboard. Memory cards enable a total of 16MB to be installed in the system. Two floppies, too, so you can use 1.2 and 1.44MB diskettes, as well as 360's and 720's.

Phone Now...Let Northgate begin building your computers... Today!

1-800-548-1993

Hours M-F 7 am-8 pm CST, Sat. 9 am-3 pm CST
New Canadian Toll-Free Order Hotline 1-800-338-8383

TERMS: VISA, MC, COD, Credit Card, Pre-Payment (allow 2 weeks for personal checks to clear) Wire Transfer and Purchase Orders for Rated Accounts. We also ship to APO and FPO. All shipments are FOB Minneapolis, MN.

For corporate, government and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-7791.

13895 Industrial Park Boulevard, Suite 110, Plymouth, Minnesota 55441

From Foreign Countries call: Corporate Headquarters (612)553-0111 • FAX (612)553-1695



FINANCING:

Use the Northgate "Big N" revolving credit card instead of tying up Visa or MC credit. Millions in financing available, easy to qualify.

OR... Lease a Northgate with up to five-year terms. Ideal when cash flow is important. Phone for details.

Northgate and OmniKey are trademarks of Northgate Computer Systems, Inc. All other products that are trademarks or registered trademarks of their respective companies.

Because Resources Should Be Shared



BayTech engineers resource sharing solutions.

Because we know your applications for sharing printers, plotters, modems and data are unique, BayTech has developed over 30 resource sharing products, which offer you a broad range of solutions for sharing your resources.

We realize that you shouldn't have to fit your application to the specifications of a single product. With BayTech, you select the

model that meets *your* needs.

From simply sharing one or more printers between computers, to creating a complete network of computers, printers, plotters and modems, BayTech has a product designed for you.

Call us toll-free today. Our technical support staff will show you how to make the most of your resources.

BayTech



Bay Technical Associates, Inc.
Data Communications Products Division
200 N. Second Street, P.O. Box 387
Bay St. Louis, MS 39520 USA
FAX: 601-467-4551
Telex: 910-333-1618 BAYTECH
Phone: 601-467-8231 or toll-free
800-523-2702

AN INTRODUCTION TO INDEXED FILES



The pros and cons of different kinds of indexed files and file-index structures are explained, and two programs are included to let you experiment with the various techniques.

In the last two columns, we've briefly discussed sequential files and nonindexed random-access files. It's now time to take a look at indexed random-access files, the type most likely to be used by your favorite Brand X database program.

When information is stored in an indexed data file, the body of each data record is stored in a main file and an abbreviated form of the data, usually consisting of a key field and a record number or pointer, is stored in a separate index file. The key field is the element of a record that you will want to match when you search for the record later. Typically, the search key might be a customer name or account number. It's fairly common for a data set to be indexed on several different key fields, so that there are several index files associated with the same main data file.

When a program needs to locate a particular record, it first inspects the appropriate index file to try and locate the search key (name, account number, or other) for the record needed. If a matching index entry is found, the record number or position is extracted from the index and used to fetch the desired record from the main data file.

The basic premise of an indexed data file is simple. Because the index is only a subset of the entire data set, it is much smaller and can be searched much more rapidly. In fact, even when the main data file is many megabytes in size, it is usually possible to hold the entire index in memory at once. Moreover, within the index file, you can use special structures and tech-

niques to maximize the speed of searches that would be impractical within the main data file.

ORGANIZING THE MAIN FILE In some simple databases, both the index file and the main file are kept sorted in the same order, as seen in Figure 1. This approach has several minor advantages. For one thing, because it does not need to contain any record numbers, the index file is quite compact. Instead, the position of a particular key in the index file directly indicates the position of the corresponding record in the main data file. Another advantage is that you can use the index file to find a particular starting record and then process records sequentially in the main file without further reference to the index.

The ordered-main-file approach also

has some severe disadvantages. First, since the main file can be sorted only one way at a time, if you have several different indexes, you must decide which is to be the "primary" index. The subsidiary indexes must use a less-compact structure that includes record numbers.

More important, however, the ordered-main-file strategy brings with it all of the inconveniences of nonindexed ordered files that we discussed in the last column. Each time you add or delete a record, or update the key field in a record, you must move around a lot of other records in the main file as well as update the index file(s). This exacts a heavy price both in execution time and in the free disk space needed to carry out an update safely.

A more common and more efficient approach, then, is to decouple the order of

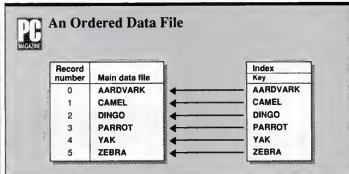


Figure 1: A data file in the same order as its index file. While conceptually simple, this approach is very inefficient if the data is not static, since much data must be moved when records are added, deleted, or changed.

■ POWER PROGRAMMING

the records in the main file from the order of the entries in the index files completely (Figure 2). This allows records to be added, deleted, or updated in the main file with a minimum of data movement. When a record is deleted, it is given a special key value that marks its position in the file as available. When a record is added to the

file, it can be stuck into the first free position in the file or added to the end of the file if no available slots are found. The program that manages the database can update the indexes each time it adds or changes a record, or it can process a batch of records and then rebuild all of the indexes simultaneously.

ORGANIZING THE INDEX FILE
Now let's peek inside the index file itself. The simplest form of index is just an abstract of the main data file, that is, a sorted list of keys associated with record numbers (see Figure 2). We can search such an index file in the same ways we used for the nonindexed files in the last column: either sequentially until the desired key is matched or excluded or with a binary search (assuming the index-file entries have a constant length).

Regardless of the search method, one drawback of such simple index files is that the search time is strongly dependent both on the contents of the index file itself and on the value of the key of interest. For example, if a binary search is used and the key values are not evenly distributed, the number of index entries which must be inspected to match a specific key may vary widely. And in real life, key values are seldom evenly distributed. Customer last names tend to begin with A, B, C, D, H, M, S, and W rather than Q and V, for example, and active account numbers tend to be heavily weighted toward the most-recently assigned number.

This is not a very desirable situation from the user's point of view. Naturally the user wants the search time for any given record to be as short as possible. But although he might not verbalize it, the user also wants search times to be *uniform*. He will get very aggravated if your program takes four times as long to find a name beginning with M as it does with a name beginning with E, or—if you do manage to convince him to live with nonuniform search times—if the search times don't vary in a "predictable" way.

Using a sequential or binary search of an index also complicates life when there can be multiple records with the same key value. In the case of the sequential search, after finding a match, you must keep reading index entries until you've found a mismatch. With the binary search, you may have to scan the index file for a mismatch in both directions from your original match to identify all the candidate records. This is worse than inelegant; it's inefficient, since you will always be obliged to inspect index records that are not matches.

Yet another drawback of such simple indexes is the amount of data movement

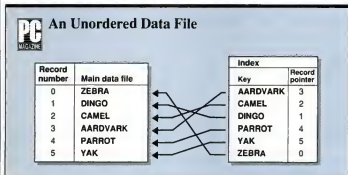


Figure 2: An unordered data file with its index file. Because the data in the main file never needs to be moved, this is more efficient than the scheme shown in Figure 1. This is the simplest type of index file, with entries of uniform length, organized sequentially in order of key value, and associating each key with a record number or position in the main file.

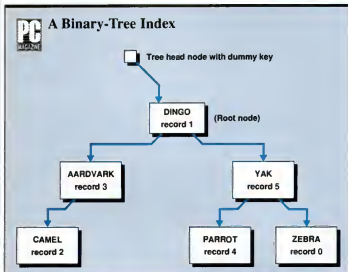


Figure 3: A binary-tree index. The "root" node of the index contains the key for the first record that was added to the data file. Its linkages point to two subtrees: one holds the index entries for all records with lesser keys and the other indexes the records with greater keys.

"I don't want to hear about trading 386 performance for portability...It's just not an option."



ZENITH INNOVATES AGAIN™

Today's leader in battery-powered portables gives you the first 386 laptop with all the options you asked for.

It's here. TurbosPort 386.™ Created for one simple reason: You asked for it. Another Zenith Data Systems innovation for the way you work every day.

The lightweight TurbosPort 386 is a technological first loaded with one breakthrough after another. Like our *Page White* display, which virtually duplicates printed-page clarity. With sharp black images on a fluorescent backlit screen. And for ultimate speed, we've innovated far beyond our competition. To maximize your *Windows*-based applications in or out of the office.

TurbosPort is also the first 386 laptop to ride on Zenith's *Intelligent Power Management System*.™ It gives you control of battery usage, so you'll always have the 386 performance you need. With no plugs. No cords to tie you

down. You even get the desktop comfort of a detachable keyboard.

Now you no longer have to trade power for portability. And the proof is in the innovation. The Zenith Data Systems TurbosPort 386. The only portable to give you all the options of 386 desktop performance. In the office. Or anywhere.

For the name of your nearest Zenith Data Systems authorized dealer, call 1-800-553-0559.



ZENITH

**data
systems**

THE QUALITY GOES IN BEFORE THE NAME GOES ON®

Graphics simulate Microsoft® Windows, a product of Microsoft Corporation. Microsoft® Windows is included with all hard disk models of Zenith Data Systems' advanced desktop systems.

CIRCLE 337 ON READER SERVICE CARD

©1989, Zenith Data Systems



WordPerfect Office™ gives your network the power of positive linking.

Your PC network can greatly improve group productivity and organization – if you give it the power to do so.

WordPerfect Office can supply that power. Its Electronic Mail feature lets network users exchange files, memos and phone messages. And it employs password protection and other security mechanisms to ensure that your communications remain confidential.

WordPerfect Office's unique Scheduler enables anyone on the network to set up internal meetings, reserve conference rooms, or do both simply by keying in the appropriate information and letting the program go to work.

WordPerfect Office also integrates application software on a flexible "shell" menu, giving you one-keystroke access to any program, and letting you exchange data between compatible programs in a matter of seconds.

And WordPerfect Office features a Notebook pro-

gram that makes it easy to create, organize and call up frequently-used data records. Office also provides network users with a calendar, file manager, macro editor, program editor and calculator.

Like any WordPerfect® product, WordPerfect Office has a familiar, intuitive look and feel. It can maximize the powers of communication – of your network and the people who use it. So check out what our Office can do for your office.

For more information write to WordPerfect Corp.,
1555 North Technology Way, Orem, Utah, 84057
Or call (801) 225-5000. (In Canada, call 1-800-267-2499.)

Office
for PC networks



WordPerfect
CORPORATION

■ POWER PROGRAMMING

involved in adding or deleting an index entry. Of course, it's much less work than moving the actual records around in the main file. Still, we'd like to reduce further—better yet, eliminate—the need for data movement altogether.

Over the years, the gods of computer science have come up with multiple answers to these problems. One of the most commonly used solutions is to structure the index as a binary tree. In such a scheme, each entry in the index file is a node in the tree. The node consists of a key value, a record pointer into the main file, and a linkage to a "left" and "right" subtree (which might be a null link, if that subtree is empty). The first entry in the index file is the *root* of the binary tree; its "left" link points to the subtree containing all nodes with lesser keys, and the "right" link points to the subtree holding all nodes with greater keys.



A Balanced Binary-Tree Index

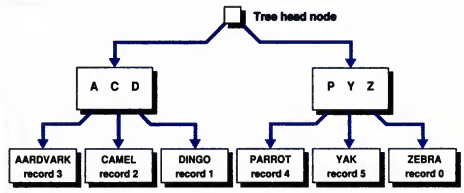


Figure 4: A balanced binary-tree index. Although similar to the index in Figure 3, this tree contains two kinds of nodes: internal nodes, which only point to other nodes, and external nodes, which point to actual data records. In a balanced tree, the number of nodes that must be examined to find any particular index entry is a constant.

```
/*
 * MAKEIXF.C Creates an indexed random access file for use by SRCHXF.C
 * Copyright (c) 1989 Riff Communications Co.
 * PC Magazine - Ray Duncan
 */
```

```
The user is prompted to enter from zero to one hundred
ASCII strings. These strings are used to build records
in the main data file TESTFILE.DAT and two index files:
TESTFILE.IX1, which is a simple sorted index containing
keys and record numbers, and TESTFILE.IX2, which is a
binary tree index.
```

```
Each record in TESTFILE.DAT is EXISE bytes long. The
format of the index files is defined by the constant
IX1SZ and by the structures 'index1' and 'index2'.
All these manifest constants and structures must be kept
synchronized with SRCHXF.C.
```

```
/*
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <fcntl.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <unistd.h>

#define IX1SZ 80 /* max entry length */
#define N_ITEMS 100 /* max number of strings */
#define EXISE 64 /* fixed record size */
#define EXISE 8 /* maximum key length */

char items[N_ITEMS * EXISE]; /* original entries stored here */

struct index1 { /* sorted sequential index */
    char key[EXISE];
    int rnum;
} index1[N_ITEMS];

struct index2 { /* binary tree index */
    char key[EXISE];
    int rnum;
    int left;
    int right;
} index2[N_ITEMS * 1];

int getkeys(void);
void writedata(int);
void writeindex1(int);
void writeindex2(int);
void treeinsert(int, int);
void dumptree(int);

main()
{
    int i; /* number of record keys entered */

    i = getkeys();
    writedata(i);
    writeindex1(i);
    writeindex2(i);
    dumptree(0);
}
```

```
/*
 * Get record keys from user, leave them in array 'items',
 * return number of keys to caller.
 */
int getkeys(void)
{
    int i, j; /* scratch variables */

    puts("Enter keys for file records...");

    i = 0; /* initialize string count */
    while(i < N_ITEMS) /* enforce maximum entries */
    {
        printf("Add %d: ", i+1);
        geta(items[i]); /* Read keyboard, store in array */

        /* last entry if empty line */
        if(items[i] == '\n') break;

        for(j = 0; j < i; j++) /* make sure not duplicate key */
            if(strcmp(items[i], items[j]) == 0) break; /* exit loop if duplicate found */

        if(j == 0) i++; /* count non-duplicate strings */
        else puts("Duplicate key, try again.");
    }

    return(i); /* return no. of keys entered */
}

/* Create main data file TESTFILE.DAT, using strings stored
 * in array 'items'.
 */
void writedata(recs)
{
    int i = 0; /* scratch variable */
    int fh; /* handle for output file */
    char recbuf[EXISE]; /* scratch record buffer */

    /* create main data file */
    fh = open("TESTFILE.DAT", O_WRONLY | O_CREAT | O_TRUNC | O_BINARY, 0777);

    if(fh == -1) /* terminates if create failed */
    {
        puts("Can't create TESTFILE.DAT.");
        exit(1);
    }

    puts("Writing TESTFILE.DAT...");

    while(i < recs) /* build and write records */
    {
        memset(recbuf, 0, EXISE);
        strcpy(recbuf, items[i]);
        write(fh, recbuf, EXISE);
        i++;
    }
}
```

(continues)

Figure 5: MAKEIXF.C, a "test-bed" C program for creating an indexed data file based on ASCII keys entered by the user. The resulting files, named TESTFILE.DAT, TESTFILE.IX1, and TESTFILE.IX2, are used by the SRCHXF program shown in Figure 6.

■ POWER PROGRAMMING

```

    close(fh); /* release file handle */

/*
Create sequential index file TESTFILE.IX1, using strings stored
in array 'items'. The index is first built in the structure
'index1' by copying each key to the structure and associating
it with a record number. The index is then sorted and written
to disk.
*/
void writeindex1(recs)
{
    int i = 0; /* scratch variable */
    int fh; /* handle for index file */
    while(i < recs) /* build index entries */
    {
        structp[index1[i].key, itemno[i] * ISIZE + 1, KSIZIE];
        index1[i].recno = i;
        i++;
    }
    if(recs != 0) qsort(index1[0], recs, sizeof(index1[0]), strcmp);

    fh = open("TESTFILE.IX1", O_WRONLY | O_CREAT | O_TRUNC | O_BINARY, 0_RDWR);
    if(fh == -1) /* terminate if create failed */
    {
        puts("Can't create TESTFILE.IX1.");
        exit(1);
    }
    puts("Writing TESTFILE.IX1...");
    for(i = 0; i < recs; i++) /* write the index file */
        write(fh, (char *) index1[i], sizeof(index1[0]));
    close(fh); /* release handle */
}

/*
Create binary tree index file TESTFILE.IX2, using strings
stored in array 'items'. The keys are added into the tree
in the order of their original entry, and are associated
with a record number. The index is then written to disk.
*/
void writeindex2(recs)
{
    int i = 0; /* scratch variable */
    int fh; /* handle for index file */
    memset(index2[0], 0, sizeof(index2[0])); /* initialize tree head */
    index2[0].left = -1; /* lowest possible key */
    index2[0].right = -1; /* link -1 indicates an empty subtree */
    while(i < recs) /* build binary tree */
    {
        treeninsert(i, 1); /* add new node for current string */
        i++; /* and count strings processed */
    }
    fh = open("TESTFILE.IX2", O_WRONLY | O_CREAT | O_TRUNC | O_BINARY, 0_RDWR);
    if(fh == -1) /* terminate if create failed */
    {
        puts("Can't create TESTFILE.IX2.");
        exit(1);
    }
    puts("Writing TESTFILE.IX2...");
    for(i = 0; i < recs; i++) /* write the index file */
        write(fh, (char *) index2[i], sizeof(index2[0]));
    close(fh); /* release handle */
}

/*
Add a new node to the binary tree. Procedure is called with an
index to array 'items' (used to locate the key for the node
being added) and as the record number for TESTFILE.DAT) and the
number of the next free node.
*/
void treeninsert(itemno, new)
{
    int i, j, node = 0; /* scratch variables */
    do /* find tree insertion point */
    {
        i = node;
        /* to choose subtree, compare this
        node to key being added */
        if(i == strcmp(items[itemno] * ISIZE, index2[i].key, KSIZIE) < 0)
            node = index2[i].left;
        else node = index2[i].right;
    } while (node != -1); /* until empty subtree found */
    index2[new].left = -1; /* build a new node; link = -1 */
    index2[new].right = -1; /* indicates empty subtree */
    index2[new].recno = itemno; /* record no. for main details */
    strcmp(index2[new].key, items[itemno] * ISIZE, KSIZIE);
    if(i < 0) index2[i].left = new; /* update parent node link field */
    else index2[i].right = new;
}

/*
Debugging routine to dump binary tree nodes in order of keys.
This is just to demonstrate that we are writing a valid and
correctly ordered tree and that there are no wild link fields.
*/
void dumptree(nodes)
{
    if(nodes == -1) /* ignore empty subtree */
        dumptree(index2[nodes].left); /* display left subtree */
    if(nodes == 0) printf("Contents of binary tree index:");
    else printf("Node = %d, Record no. = %d, Record key = %s",
        nodes, index2[nodes].recno, index2[nodes].key);
    dumptree(index2[nodes].right); /* display right subtree */
}

```

(Figure 5 ends)

```

/*
SRCHIXF.C Searches indexed details previously created by MAKEIXF.EXE.
Copyright (c) 1989 Siff Communications Co.
PC Magazine - Ray Duncan

The user is prompted to enter a search key. The first
8 characters of the key are used to search the sorted
index file TESTFILE.IX1 (using both sequential and binary
search algorithms) and the binary tree index file
TESTFILE.IX2. If a match is found, the corresponding
record number and contents from TESTFILE.DAT are displayed,
along with the number of index inspections used by each
method.

Each record in TESTFILE.DAT is KSIZIE bytes long. The
format of the index files is defined by the constants
KSIZIE and by the structures 'index1' and 'index2'.
All these manifest constants and structures must be kept
synchronized with MAKEIXF.C.
*/
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <fcntl.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <io.h>

#define KSIZIE 64 /* fixed record size */
#define ISIZE 8 /* maximum key length */

static int inspected; /* index entries inspected counter */

struct index1 {
    char key[KSIZIE];
    int recno;
};

struct index2 {
    char key[KSIZIE];
    int recno;
    int left;
    int right;
};

int binsearch(int, char *, int, int); /* function prototypes */
int seqsearch(int, char *);
int treesearch(int, char *);

main()
{
    int i; /* scratch variable */
    int fh, fhix1, fhix2; /* file handles */
    long filesize; /* size of file in bytes */
    int frecs; /* number of records in file */
    char key[KSIZIE]; /* key entered by user */
    char rec[KSIZIE]; /* scratch record buffer */

    fh = open("TESTFILE.DAT", O_RDONLY | O_BINARY);
    fhix1 = open("TESTFILE.IX1", O_RDONLY | O_BINARY);
    fhix2 = open("TESTFILE.IX2", O_RDONLY | O_BINARY);
    if((fhix1 == -1) || (fhix2 == -1) || (fh == -1))
    {
        puts("Missing data or index file.");
        exit(1);
    }
    filesize = lseek(fh, 0L, SEEK_END); /* find file size */
    frecs = filesize / KSIZIE; /* calculate number of records */
    printf("TESTFILE.DAT contains %d bytes, %d records.", filesize, frecs);
    while(1)
    {
        printf("\nEnter key: "); /* prompt user and */
        getc(key); /* input record key */
        if(key[0] == 0) break; /* terminate if empty line */
        if(strlen(key) > KSIZIE)
            printf("Warning: key truncated to %d characters.", KSIZIE);
        inspected = 0; /* reset index entries counter */
        /* perform sequential search of
        TESTFILE.IX1, display results */
        (continues)

```

Figure 6: SRCHIXF.C, a C program that performs sequential, binary, and binary-tree searches on the indexed data file created by MAKEIXF.

IF YOU LIKED OUR AD, YOU'LL LOVE THE BOOK.

On the back cover of this magazine, you'll find a 4-page ad about our 386™ systems, 286 systems, laser printers, and low direct-from-the-manufacturer prices. And if you

like what you see, we have a 28-page catalog you'll like even more. Just send the card below, and we'll send you a free copy. Or call (800) 426-5150. In Canada, call (800) 387-5752.



© 1988 DELL COMPUTER CORPORATION. 386 is a trademark of Intel Corporation.

GET OUR FREE 28-PAGE CATALOG OF DELL COMPUTER SYSTEMS.

This new catalog is the best place to shop for high performance 386 and 286 systems. We also offer a full line of software, peripherals, enhancement products, and networking solutions. Just send this card, and we'll send you a copy.

Name: _____

Title: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

☐ Please have a Dell representative call me.

1. Are you a (select one):

- A ☐ End user
- B ☐ Consultant
- C ☐ Reseller
- D ☐ Corporate Purchaser
- E ☐ DP/MIS Manager

2. Which products are you most interested in?

- A ☐ 286 architecture
- B ☐ 386 architecture

3. Are you interested in computer products for:

- A ☐ Home
- B ☐ Business

4. How many PCs do you have installed now?

- A ☐ 1-10
- B ☐ 11-20
- C ☐ Over 21

5. How many PCs do you (your company) plan to purchase in the next twelve months?

- A ☐ 1-10
- B ☐ 11-20
- C ☐ Over 21

6. Is your requirement:

- A ☐ Immediate
- B ☐ 1-3 Months
- C ☐ Over 3 Months
- D ☐ Info only

AD CODE 51B32

GET OUR FREE 28-PAGE CATALOG OF DELL COMPUTER SYSTEMS.

This new catalog is the best place to shop for high performance 386 and 286 systems. We also offer a full line of software, peripherals, enhancement products, and networking solutions. Just send this card, and we'll send you a copy.

Name: _____

Title: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____

☐ Please have a Dell representative call me.

1. Are you a (select one):

- A ☐ End user
- B ☐ Consultant
- C ☐ Reseller
- D ☐ Corporate Purchaser
- E ☐ DP/MIS Manager

2. Which products are you most interested in?

- A ☐ 286 architecture
- B ☐ 386 architecture

3. Are you interested in computer products for:

- A ☐ Home
- B ☐ Business

4. How many PCs do you have installed now?

- A ☐ 1-10
- B ☐ 11-20
- C ☐ Over 21

5. How many PCs do you (your company) plan to purchase in the next twelve months?

- A ☐ 1-10
- B ☐ 11-20
- C ☐ Over 21

6. Is your requirement:

- A ☐ Immediate
- B ☐ 1-3 Months
- C ☐ Over 3 Months
- D ☐ Info only

AD CODE 51B32

IF YOU CAN'T CALL, WRITE.

On the back cover of this magazine, there's a 4-page ad for Dell Computer Systems. It invites you to call our toll-free number, so you can get

our free 28-page catalog. But if you'd rather send this card, that's fine with us. Just fill it out, and we'll get a catalog to you right away.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL


FIRST CLASS MAIL PERMIT NO. 6745 AUSTIN, TEXAS

POSTAGE WILL BE PAID BY THE ADDRESSEE

DELL COMPUTER CORPORATION

Dept. ME

9505 Arboretum Boulevard
Austin, Texas 78759-9969



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL


FIRST CLASS MAIL PERMIT NO. 6745 AUSTIN, TEXAS

POSTAGE WILL BE PAID BY THE ADDRESSEE

DELL COMPUTER CORPORATION

Dept. ME

9505 Arboretum Boulevard
Austin, Texas 78759-9969



■ POWER PROGRAMMING

```

printf("Insequential search result: ");
if(i = asearch(fhval, key)) == -1) printf("record not found.");
else printf("record number is %d.", i);
printf(" %d index entries inspected.", inspected);

inspected = 0; /* reset index entries counter */

/* perform binary search of
   TESTFILE.IN1, display results */

printf("Binary search result: ");
if(i = bsearch(fhval, key, 8, frca-1)) == -1)
    printf("record not found.");
else printf("record number is %d.", i);
printf(" %d index entries inspected.", inspected);

inspected = 0; /* reset index entries counter */

/* perform binary tree search of
   TESTFILE.IN2, display results */

if(i = tsearch(fhval, key) == -1) printf("record not found.");
else printf("record number is %d.", i);
printf(" %d index entries inspected.", inspected);

if(i != -1) /* fetch record from main data */
{
    fseek(fhd, (long) (i * RSIZE), SEEK_SET);
    read(fhd, rwc, RSIZE);
    printf("contents of record %d: %s", i, rwc);
}

close(fhd); /* release file handles */
close(fh1);
close(fh2);
}

/* search index file TESTFILE.IN1 sequentially to match the
   specified key. Called with a file handle and key address.
   Returns the record number for TESTFILE.DAT if match found,
   or -1 to indicate no match.

*/ int asearch(int fh, char *keytr)
{
    int i; /* scratch variable */
    struct _index index1; /* receives index file data */
    fseek(fh, 0L, SEEK_SET); /* rewind to start of file */

    while((code = fgetc(fh)) != EOF) /* do until end of file found */
    {
        if(code == '\n') /* inspect index entry */
        {
            i = atoi(index1.key, RSIZE); /* if matched, return record no. */
            if(i == 0) return(index1.record); /* else traverse tree */
            else code = index1.left;
        }
        else code = index1.right;
    }

    return(-1); /* no match, return -1 */
}

/* binary search of TESTFILE.IN2 to match the specified
   key. Called with a file handle and key address. Returns
   the record number for TESTFILE.DAT if match found,
   or -1 to indicate no match.

*/ int bsearch(int fh, char *keytr)
{
    int i; /* scratch variable */
    struct _index index2; /* current node being inspected */
    while((code = fgetc(fh)) != EOF) /* do until match or empty subtree */
    {
        if(code == '\n') /* inspect index entry */
        {
            i = atoi(index2.key, RSIZE); /* if matched, return record no. */
            if(i == 0) return(index2.record); /* else traverse tree */
            else code = index2.left;
        }
        else code = index2.right;
    }

    return(-1); /* no match, return -1 */
}

```

(Figure 6 ends)

To find a particular key, the binary tree is traversed from the root, as shown in Figure 3. At each node the key is compared. If it doesn't match the node exactly, then—based on the result of the comparison—one branch or the other of the node's subtree is selected. This process, which is admirably suited to languages that support recursion, is continued until the key is matched or until an empty subtree is reached.

In such a binary-tree index, the physical order of the entries in the index file is irrelevant and the index is easy to update dynamically. When a new record is added to the main data file, a corresponding index node can be physically added at the end of the index file, after which its linkage fields and those of the node that will become its "parent" are updated. Very little work and almost no data movement are required. Similarly, nodes can be logically deleted from the tree merely by adjusting some linkages.

Simple binary trees can lead to difficul-

ties, however. When keys are not well distributed or are added to the tree in a non-random fashion, the tree can become quite asymmetrical. As with the binary search

■ In a binary-tree index, the physical order of the entries in the index file is irrelevant and the index is easy to update dynamically.

we've already discussed, this leads to wide variations in tree traversal times. The computer scientists' answer to this is the "balanced" tree (sometimes called a *B-tree*), in which all subtrees of the nodes at a par-

ticular tree level have the same length. Such a tree is shown in Figure 4.

Balanced-tree indexes are implemented with two types of nodes rather than one. *Internal nodes* point only to other nodes, and *external nodes* point to the records actually being indexed. Internal nodes must be able to contain more than one key, and they can have multiple linkages to the next-lower level. Balanced trees are very widely used because of their excellent performance on worst-case key distributions. The creation and maintenance of balanced trees is a complex subject and far beyond the scope of this column, although we may return to it in a later installment. In the meantime, let me refer you to Chapters 15 and 18 of Robert Sedgwick's *Algorithms* for further details.

INDEXED FILE TEST-BEDS The two programs that accompany this column are test-beds that let you build small indexed files and then search them by several different methods.

In touch with Tomorrow
TOSHIBA

TOSHIBA is the world's number one name in LAP TOP Computers and 24-Pin Printers. And SEFCO is fast becoming known for its low pricing, service, and availability on fine Toshiba products.

SEFCO COMPUTER PRODUCTS

America's -1 Source for LAP TOP Computers and 24-Pin Printers



- PRICING
- SERVICE
- AVAILABILITY

1(800)777-1288

Please call — We look forward to hearing from you.

Convenient Location's Nationwide



SEFCO

SUCCESS BY DESIGN

CIRCLE 222 ON READER SERVICE CARD

FOR RETAILERS ONLY:

BECAUSE YOU SELL ONE OF THESE...



YOU SHOULD SELL THIS...

Bring PC MAGAZINE, the "silent salesman," into your store and provide your customers with clearly written comparative reviews of the hardware and software you carry!

Knowledgeable PC users turn to PC MAGAZINE 22 times a year for in-depth evaluations conducted by PC Labs, our independent product testing laboratory. Increase the sales of your inventory and earn additional profits with PC MAGAZINE. For more information on how you can sell the profit leader, call (212) 503-5331 or write:

Chris Cherry—Retail Sales
Representative
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016



PRODUCTIVITY

■ POWER PROGRAMMING

The first program, MAKEIXF.C (Figure 5), prompts you for up to 100 short ASCII strings. When you press Enter alone in response to a prompt, it creates a main data file named TESTFILE.DAT. The program then sorts the strings and creates two index files: TESTFILE.IX1 and TESTFILE.IX2. The main data file is arranged in the order that you entered the strings, so you can set up various worst-case situations. The first index file is a simple sorted list of keys and record numbers; the second is implemented as a binary tree.

The second program, SRCHIXF.C, is

■ Both MAKEIXF.C and SRCHIXF.C can be used in MS-DOS or OS/2 without any changes.

listed in Figure 6. It opens TESTFILE.DAT, TESTFILE.IX1, and TESTFILE.IX2, and prompts you for a key to search for. It then searches both index files and reports whether the record exists. If it does, SRCHIXF.C tells you how many keys had to be inspected by the sequential search, binary search, and tree search methods to find it.

Both programs can be used under either MS-DOS or OS/2 without any changes. To compile the two programs, enter the commands

```
CL MAKEIXF.C  
CL SRCHIXF.C
```

Run MAKEIXF.EXE first to create a data file, then run SRCHIXF.EXE to experiment with it. You are able to terminate SRCHIXF.EXE at any time by pressing Enter alone, Ctrl-C, or Ctrl-Break in response to a prompt.

THE IN-BOX

Please send your questions, suggestions, and comments to me at any of the following e-mail addresses:
PC MagNet: 72241,52
MCI Mail: lmi
BIX: rduncan

USSMSG10: MAINFRAME 0013: Enter Application

E-Mail

USSMSG2: R70302 E-MAIL COMMAND UNRECOGNIZED

E-Mail PLEASE!

USSMSG2: R70302 E-MAIL COMMAND UNRECOGNIZED

E-Mail PRETTY PLEASE!!

Why can't mainframes speak English?

You have to wonder why the people who design big computers make it so difficult for normal human beings to use them.

Particularly non-technical, hastily trained human beings, who need to talk to the mainframe from their PCs.

It's been a serious dilemma. Until NOW!

NOW! is a menu-making, macro-writing tool that automates the drudge work of

PC-to-host communication.

When someone wants to review their E-Mail, for instance, all they need do is make one menu selection.

NOW! then takes on the tedious job of loading the 3270 software, log-

ging onto the mainframe, and wading through the passwords and commands to arrive at the E-Mail screen.

It's not hard to see how NOW! reduces wasted time, needless stress and training costs.

Nor is it difficult to find out more. Simply call or write and we'll send you a free demo disk and detailed information.

All of which, you'll be pleased to hear, is written in a language called English.

NOW!
PC/HOST AUTOWARE™
Attachmate

1-800-426-6283

IN WASHINGTON STATE 206-644-4700.
NOW! and Attachmate are trademarks of Attachmate Corporation, Berkeley, CA.
IBM is a registered trademark of International Business Machines Corporation.
CIRCLE 124 ON READER SERVICE CARD

INTRODUCING THE 386 PERFORMANCE SERIES- COMPUTERS THAT GIVE YOU *FULL* POTENTIAL.

FIVESTAR 386s HAVE THE POWER AND FLEXIBILITY TO BE USED AS POWERFUL FILESERVERS, FULLY COMPATIBLE WORKSTATIONS, OR TOTAL DESKTOP SOLUTIONS.

Easy to use in NOVELL and 3-COM
networks. Supports MS-DOS, MS OS/2,
Unix and Xenix operating systems.



Model 325

- INTEL 32-bit 80386 Processor running at 25/6MHz user selectable, zero wait states
- 1MB RAM expandable to 32MB 32-bit Memory
- 80387 and Weitek 3167 support
- LANDMARK 41.5MHz Rating
- MIPS 5.84 Rating
- 128KB cache memory
- SLOTS: one 8-bit; four 16-bit; three 32-bit (one dedicated for memory)
- Serial/Parallel/Game Ports
- 1.2MB or 1.44MB Floppy Drive
- 101-key Enhanced Keyboard
- 16-bit VGA Video Card
- 1:1 Interleave Hard Disk Controller

\$3,895

Model 320

- INTEL 32-bit 80386 Processor running at 20/8MHz user selectable, zero wait states
- 1MB RAM expandable to 16MB 32-bit Memory
- 80387/20 Coprocessor support
- LANDMARK 30.0MHz Rating
- MIPS 4.33 Rating
- 64KB cache memory
- SLOTS: one 8-bit; six 16-bit; one 32-bit
- Serial/Parallel/Game Ports
- 1.2MB or 1.44MB Floppy Drive
- 101-key Enhanced Keyboard
- 16-bit VGA Video Card
- 1:1 Interleave Hard Disk Controller

\$2,795

Model 316

- INTEL 32-bit 80386 Processor running at 16/8MHz user selectable, zero wait states
- 1MB RAM expandable to 16MB 32-bit Memory
- 80387/16 Coprocessor support
- LANDMARK 24.0MHz Rating
- MIPS 3.43 Rating
- 64KB cache memory
- SLOTS: one 8-bit; six 16-bit; one 32-bit
- Serial/Parallel/Game Ports
- 1.2MB or 1.44MB Floppy Drive
- 101-key Enhanced Keyboard
- 16-bit VGA Video Card
- 1:1 Interleave Hard Disk Controller

\$2,195

Model 316SX

- INTEL 80386 Processor running at 16MHz, zero wait states
- 1MB RAM
- 80387SX Coprocessor support
- LANDMARK 19.0MHz Rating
- SLOTS: two 8-bit; six 16-bit
- Serial/Parallel/Game Ports
- 1.2MB or 1.44MB Floppy Drive
- 101-key Enhanced Keyboard

\$1,495



These Performance Pluses are included* on FIVESTAR 386s!

- High-speed 16-bit VGA Video Card (Up to 300% faster screen update)
- Hard Disk Controller using 1:1 Interleave (Up to 300% faster transfer time)

*Optional on Model 316SX

On-Site Service Included!

- FIVESTAR Computers include 1 Year of On-site Service. Service Centers nationwide!

Complete Satisfaction Guaranteed!

- FIVESTAR Computers come with a 30 Day Money Back Guarantee and One Year Limited Warranty on parts and labor. Call for details.

All prices and specifications are subject to change without notice.
FIVESTAR, Intel, Novell, 3-COM, Unix, Xenix, MS-DOS and MS OS/2 are registered trademarks.

CIRCLE 319 ON READER SERVICE CARD

FIVESTAR COMPUTER CORPORATION

To order, call: 800-752-5555

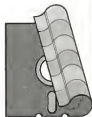
Customer Support: 800-882-4950

1621 W. Crosby Road, Carrollton, Texas 75006

AD CODE
0455

■ DOUGLAS COBB AND STEVEN COBB

SPREADSHEET CLINIC



Printing the current time in the header or footer of a 1-2-3 worksheet; entering values as unattached text in Excel can cause a problem; calculating time in a SuperCalc worksheet.

Adding hours, minutes, and seconds in a SuperCalc worksheet

I have found that I need to calculate the total of the hour, minute, and second entries in my SuperCalc 4 worksheets. A simplified version of one of my worksheets is shown in Figure 1.

Cells B4:B8 contain values that represent whole numbers of hours; cells C4:C8 contain values that represent whole numbers of minutes; and cells D4:D8 have values that represent whole numbers of seconds.

To sum these values, I've used the formulas

```
B10: SUM(B4:B8)+INT((SUM(C4:C8)+
INT(SUM(D4:D8)/60))/60)
C10: MOD(SUM(C4:C8)+INT(SUM(D4:D8)/60,60)
D10: MOD(SUM(D4:D8),60)
```

in cells B10, C10, and D10, respectively. The formula in cell D10 calculates the number of seconds, above and beyond the number of whole minutes, represented by the sum of the second values in cells D4:D8. For example, the sum of the values in cells D4:D8 is 143. Since 143 seconds is 2 minutes and 23 seconds, this formula returns the value 23.

The formula in cell C10 calculates the number of minutes, above and beyond the number of whole hours, represented by the sum of the minute entries in cells C4:C8 plus the minute component of the sum of the second entries in cells D4:D8. In this case, the sum of entries in cells C4:C8 is 162; the minute component of the sum of the second entries in cells D4:D8 is 2. Since 162 plus 2 equals 164, and 164 min-

utes is equal to 2 hours and 44 minutes, the function in cell C10 returns the value 44.

In cell B10, the formula calculates the number of hours, above and beyond the number of whole minutes, represented by the sum of the hour entries in cells B4:B8 and the hour component of the sum of the minute entries in cells C4:C8 (including the minute component of the sum of the

second values in cells D4:D8). Here, the sum of entries in cells B4:B8 is 97; the hour component of the sum of the minute entries in cells C4:C8 (including the minute component of the sum of the second values in cells D4:D8) is 2. Since 97 plus 2 equals 99, the function in cell B10 returns the value 99.—Joseph Gonzalez; San Juan, Puerto Rico

	A	B	C	D	E
1					
2		Hours	Minutes	Seconds	
3		-----	-----	-----	
4	Task 1	15	21	50	
5	Task 2	14	17	11	
6	Task 3	7	59	21	
7	Task 4	22	42	18	
8	Task 5	39	23	43	
9		-----	-----	-----	
10		99	44	23	
11					

Figure 1: The formulas in cells B10, C10, and D10 of this worksheet calculate the total of the hour, minute, and second entries in cells B4 to D8.

	A	B	C	D	E	F
1						
2		Days	Hours	Minutes	Seconds	
3		-----	-----	-----	-----	
4	Task 1	1	15	21	50	
5	Task 2	2	14	17	11	
6	Task 3	3	7	59	21	
7	Task 4	4	22	42	18	
8	Task 5	5	39	23	43	
9		-----	-----	-----	-----	
10		.19	3	44	23	
11						

Figure 2: The formulas in cells B10, C10, D10, and E10 of this worksheet calculate the sum of the days, hours, minutes, and seconds in cells B4 to E8.

■ SPREADSHEET CLINIC

The technique described above will work in any spreadsheet program. If you want to, you can extend this technique to calculate days as well, as shown in Figure 2.

The formula in cell B10

```
B10: SUM(B4:B8)+INT((SUM(C4:C8)+
INT((SUM(D4:D8)+INT(SUM
(E4:E8)/60)/60)/24)
```

calculates the number of whole days; the formula

```
C18: MOD(SUM(C4:C8)+INT((SUM(D4:D8)+
INT(SUM(E4:E8)/60)/60),24)
```

in cell C10 calculates the number of whole hours; and the formulas

```
D10: MOD(SUM(D4:D8)+INT(SUM(E4:E8)/60),60)
E10: MOD(SUM(E4:E8),60)
```

in cells D10 and E10 of the worksheet, calculate the number of whole minutes and seconds, respectively.

Excel modifies certain values entered in a chart as unattached text

I recently encountered a problem while I was adding unattached text to a chart that was created using the *Excel* program. When I entered the value 40,000 as unattached text for a chart, *Excel* converted that value into the string ="-25536".

Figure 3 below shows the result.

Experimenting further, I discovered that this problem occurs with any value between 32,768 and 65,535, inclusive. Specifically, *Excel* subtracts values in this range from 65,536, multiplies the difference by -1, and displays the result in the chart.

Fortunately, you can circumvent this bug by entering the value in text form. For example, to display the characters 40,000 as unattached text, type = "40000". Then press the Enter key and *Excel* will convert the entry to 40,000, displaying this value in the chart.—Jaime Castro; Atlanta, Georgia

Apparently, *Excel* is storing values that are between 32,768 (32K) and 65,535 (one less than 64K) in short integer (16-bit) form, rather than in long integer (32-bit) form, as it should. Since the 16th bit in a 16-bit signed integer controls the sign of the value, the value 32,768 becomes -32,768; the value 32,769 becomes -32,767; the value 32,770 becomes -32,766; and so forth. *Excel* correctly stores values of 64K and greater in long integer form. Microsoft has corrected this problem in Version 2.1 of *Excel*.

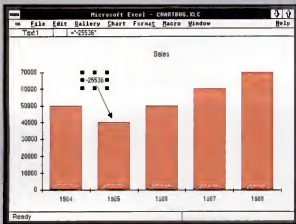


Figure 3: If you enter a value between 32,768 and 65,535 as unattached text in a chart, *Excel* will subtract it from 65,536 and multiply the result by -1.

How to print the current time at the top or bottom of 1-2-3 worksheets

The *Lotus 1-2-3* program lets you use the @ symbol to insert the current date into the header or footer of a printed worksheet. However, 1-2-3 fails to provide a symbol that inserts the current time into either of these structures. To put the current time into the header of a document, I have come up with the macro shown in Figure 4. You can easily modify this macro so that it inserts the current time into the footer as well.

The first statement in this macro enters the serial value of the current time into the cell named TIME (B7). Since this cell is assigned the Time 2 format, 1-2-3 will display that entry in hh:mm AM/PM form. Next, the macro tells 1-2-3 to issue the /Print Printer Options Header command and erase the current header (if there is one). The macro will then type the characters @ 1 1.

The current header will not be erased if the area to the right of the "Enter Header Line:" prompt is blank. Instead, the {Esc} key will return 1-2-3 to the /Print Printer Options menu. However, typing a character—in this case the letter X—assures that this area won't be blank. The next three characters, @ 1 1, specify a header that has the current date at its left edge, nothing in the middle of the page, and, at least to this point, nothing at the right edge of the page.

Before 1-2-3 presses the Enter key to lock in this header, it will execute this statement

```
B3: '{Contents NEXT,TIME}
```

This instructs 1-2-3 to place a copy of what appears in the cell named TIME into the cell named NEXT (B4). For example, suppose that TIME contains the serial time value .75000. Because of the Time 2 format, this value will be displayed as 06:00 PM in the worksheet. Since column B is nine characters wide, the {Contents} command will place the nine-character label '06:00 PM' (note the single trailing space) into NEXT.

NEXT is the next cell in the macro, so 1-2-3 will now type the label that it just entered into NEXT. Since 1-2-3 has not yet

Connect to GenTech

PASSWORD : 1-800-843-4302

NETWORK STARTER KIT

\$975

INCLUDES NOVELL ELS 4 USER SOFTWARE
4 ARCNET CARDS, CABLING & PASSIVE HUB

STORAGE DIMENSION HD FOR LAN

ACCESS TIME 18MS/COMPSURFED/READY TO USE

230MB SCSI DRIVE

\$1899

285MB SCSI DRIVE

\$2499



NETWORK INTERFACE CARD

HARVEST ARCNET

\$99

TIARA ARCNET

\$109

HARVEST ETHERNET

\$159

TIARA ETHERNET

\$199

NOVELL ELS 4 USER SOFTWARE

\$879

HARD DISK FOR MAC SE/II

STORAGE DIM 90MB INT HARD DISK KIT FOR SE/II \$899
EXTEREX 60 EXT TAPE BACKUP FOR MAC SE/II \$899
SEAGATE 277N SCSI(60MB) W/UNIXMAC SOFTWARE \$879

GENTECH 286-20 (SUPER VGA SYSTEM)

\$2149

- 80286-20 Processor, 20MHz, 0 Wait state
- 1MB RAM expandable to 4MB RAM
- on Motherboard
- 80287 Support, 40MB Hard Disk
- Shadow RAM & Shadow Bios
- EMS Support for Extended Memory
- User Configurable Hard Drive Bios Table
- VGA Color Video Card, 14" Color Monitor

All our 286 and 386 systems include 1.44MB or 1.2MB floppy drive, dual floppy/hard drive controller, 200 Watt power supply Dual serial and parallel ports, and 101 key enhanced keyboard

GENTECH 386-20 \$1899

- 80386-20 Processor, 20MHz, 0 Wait state
- 1 MB RAM expandable to 4MB on Motherboard,
- Using 1 MB static column RAM, upto 12MB
- 80387 support, 21 on Norton's Benchmark
- Runs Novell, Xenix/Unix, CAD, C/S 2
- AWARD Bios, one 32BIT, five 16bit, two 8bit slots

GENTECH 286-20 \$1199

- 80286 Processor, 20MHz Clock, 0 or 1 Wait State
- 512K RAM exp. to 1 MB on Mainboard
- EMS 4.0 Driver, 80287-10 Support, Phoenix Bios
- Norton 23, Landmark 26.7 MHz

GENTECH 286-12 \$829

- 80286 Processor, 12MHz Clock, 0 Wait state
- 512K RAM exp. to 16MB using 100ns 256K D RAM
- 8 slots upgradable to 1MB on Motherboard
- Standard bios, built-in hard disk set up

GENTECH 286-10 \$779

- 80286 Processor, 10MHz Clock, 0 Wait state
- 512K RAM exp. to 16MB using 100ns 256K D RAM
- 8 slots, upgradable to 1MB On Motherboard
- Standard bios, built-in hard disk set up

GENTECH Turbo XT-10 \$479

- Nec V-20 CPU processor, 10.477 MHz switchable
- 512K RAM expandable to 640K on motherboard
- Rates 4.0 on Norton Scale
- One 350KB Floppy Drive, ser/parallel
- 84 key Keyboard

CALL FOR OUR VIDEO OPTIONS:

Monochrome, EGA and VGA

CALL FOR HARD DISK OPTIONS:

20MB MINISCRIIBE \$189

• 1 YEAR WARRANTY: All Parts and Labor.

COMPUTERS

AST RESEARCH	
NEW! BRAVO 286 9MHz W/IO DR	\$789
Premium 286, Mod 70 512K RAM, 10 MHz	\$1189
Premium 286, Mod 300 1MB RAM	\$759
Premium Workstation 103/105	\$249
Premium 386/16 Mod 5 1MB RAM	\$220
COMPAQ COMPUTER	
Deskpro Model 11 1 DR w/640KB	\$949
Deskpro 286 Mod 11 1 DR w/640KB	\$1749
Deskpro 386/25 Mod 60	\$5999
HEWLETT PACKARD	
HP VECTRA CS Mod10 CPU 8086 640KB	\$799
HP VECTRA ES Mod10 CPU 80286 640KB	\$1319
HP VECTRA ES/12 Mod10 CPU 80286/12MHz	\$1719
HP VECTRA QS/16 Mod10 CPU 80386/16MHz	\$2632
HP VECTRA RS/20C Mod100e 80386/20MHz	\$4999
HP VECTRA RS/25C Mod100e 80386/25MHz	\$6789
ZENITH	
Supersport w/2DR	\$1499
Supersport w/20MB HD	\$3299
Supersport 286 w/20MB HD	\$3099

MATH CO-PROCESSORS (LOWEST PRICES!)

NEW! NEW! 80387-SX	\$399
8037-3/8087-2	\$69/129
80287-6/80287-10	\$142/209
80387-16/80387-20	\$379/429
80387-25	\$549

LASER PRINTERS

BROTHER HL-8 Laser Printer	\$1899
w/1MB of RAM, 25 Fonts, PC Editor's choice	
HEWLETT PACKARD	
LaserJet IIiD	\$1799/2679
DeskJet/PrintJet	\$699/1029
QMS PS 610	\$4199
ONS Silentwriter LC890	\$3299

DOT MATRIX

BROTHER ML170N/1724	\$379/650
CITIZEN 1200	\$145
EPSON All Models	\$249
FUJITSU DL3400	\$579
NEC P2200/P5200/P5300	\$360/535/689
OKIDATA ML303/351	\$339/475
OKIDATA ML363/381	\$399/549
PANASONIC KXP-119/1180/1124	\$249/1124

CUSTOMER SERVICE

401-732-5556

ORDER ONLY

800-843-4302

FAX NO.

401-732-5518

VISA, MC, C.O.D. CORPORATE PO ACCEPTED
217 Broadway, Suite 615, NY, NY 10007

SCANNERS/DIGITIZERS

DEST 200 Scanner	\$249
HP Scanjet Plus	\$1129
LOGITECH SCANNER	\$199
DI Handheld Scanner	\$199
SUNMID/GRAPHICS Sunmid/KeyScan/12	\$379/449
KURTA ISONE 12X12 w/Cursor	\$399

PLOTTERS

HEWLETT PACKARD	
HP 7440A/7475A	\$975/1399
HP 7570A Draftpro plotter	\$2899
HP 7550A Plotter	\$2999
Draftpro DUXLXL	\$3699/4899
HOUSTON INSTRUMENTS	
DMP-61/DMF-62	\$3149/4295
Calcomp 1023T/043GT	\$249

MONITORS

KDS 14" Flat Amber or Paper White Monitor	\$99
KDS 14" Flat VGA Black & White Monitor	\$129
NEC Multisync 2A	\$550
NEC Multisync Plus/XL	\$899/2150
IMTEC 14" EGA / VGA Monitor	\$339/349

NETWORKING

3 COM Etherlink 3C501	\$399
3 COM Compatible Ethernet	\$259
25P1 Arcnet or Ethernet Cable	\$20
50P1 Arcnet or Ethernet Cable	\$30
Advanced Networks 286 V2.15	\$249
8FT Netware 286 V2.15	\$249

International Inquiries Welcome

We handle all your paper work

GenTech

CIRCLE 266 ON READER SERVICE CARD

Add 2% for C.O.D. Minimum PO \$500. Prices subject to change. Return authorization required for defective merchandise. All returned non-defective merchandise subject to 20% restocking charge

Notice: Never Before in Computer History Has a
Buying Opportunity Like This Been Offered...

Take Your Pick...

286/16MHz/2 MB RAM

OR **286/20MHz/1 MB RAM**

OR **386/16MHz/1 MB RAM**

A REAL 32-bit 386—NOT AN SX!

Same Price • Same Configuration

\$2699

All are COMPLETE SYSTEMS
with 68MB, 28MS Drive 14"
Graphics Monitor, OmniKey
and MS-DOS 4.01

Look At All You Get!

Features Unmatched Anywhere...

- One or two Mbyte of RAM
- 65Mbyte 28MS hard drive
- One 1.2Mbyte and 1.44Mbyte floppy drive
- Two serial, one parallel port
- Full-size desktop case
- Famed OmniKey/102 keyboard (pick of the pros)
- 14" MonoGraphics flat screen amber or white monitor
- Performance-enhancing software
- MS-DOS 4.01/GWBasic (full manuals)
- One-year warranty with our unique overnight parts replacement policy* (freight paid by Northgate)

For the second consecutive year, the readers of Computer Shopper, the world's largest computer magazine, voted Northgate Computers "Best Buy" of all products advertised in the magazine and "Best Buy" for its 80386 computer system.

* **Everyone loves our overnight replacement policy!** Faster than third party service! If any field replaceable part in your system goes down and disables your computer, Northgate guarantees to ship the proper replacement part OVERNIGHT AT OUR FREIGHT EXPENSE. You get a brand new part—be it the largest and most expensive hard drive to the smallest part—and it's shipped to you BEFORE YOU RETURN THE OFFENDING PART! Check our competition. In most cases, they must get the part or the whole computer back before you get a replacement.

NEW! Northgate "Big N" Revolving Credit Card.

(Not a lease—you own it!)
No money down • 3 years + to pay •
Low monthly payments • Unlimited funds available! Works just like your VISA or MasterCard, Or...

Lease it with Northgate...

Northgate has a flexible lease plan suited to your needs. With up to five years terms, if cash conservation is your concern, ask about leasing your system with Northgate. PHONE NORTHGATE NOW...



**286/16 OR
286/20 OR
386/16
Your Choice**



The decision is up to YOU...

- **Superb 80286/16MHz with 2MB of RAM**
- **Blazing Fast New 286/20 System**
- **True 32-Bit 80386/16 (Not an SX)**

All three are complete systems configured alike at the same astonishing landmark price!

**SPECIAL BONUS
MEMORY UPGRADE OFFER
WHEN YOU BUY THE 386/16**

Most vendors charge upwards of \$500.00 per megabyte. Add 3MB to the Northgate 386/16 for just \$999.00

NOTE: 1MB chips - 1 or 4MB only can be installed on motherboards. This price applies only to memory upgrade with the 386/16 system.

HARD DRIVE OPTIONS—

Prices include Drive and RLL, ESDI or SCSI controller.

SIZE	TYPE	ACCESS	ADD TO SYS.
40Mbyte	SCSI	18MSec	\$ 300.00
108Mbyte	RLL	28MSec	\$ 600.00
80Mbyte	SCSI	18MSec	\$ 700.00
130Mbyte	ESDI	18MSec	\$1000.00
160Mbyte	ESDI	18MSec	\$1200.00
300Mbyte	ESDI	17MSec	\$2300.00
640Mbyte	ESDI	17MSec	\$3800.00

VIDEO OPTIONS—

Prices include Monitor and video card.

SIZE	SPEED	TYPE	ADD TO SYS.
14 inch	16-Bit	VGA Mono	\$325.00
14 inch	16-Bit	VGA Color Analog	\$625.00
14 inch	16-Bit	VGA Color +	\$725.00

NOTE: VGA Mono and Analog are 640 x 480 resolutions. VGA Color + is 800 x 600.

workmanship and warranty. As with all Northgate systems, these three feature 800,000 Bytes Per Second throughput—up to three times faster than Dell, IBM, Compaq.

All systems give you 1MB RAM expandable to 16MB; Microscience's lightning quick 28MS hard disk with 68MB of storage and a 16-bit high speed RLL dual drive controller.

Add to these a host of extras only Northgate includes—BOTH 1.2 and 1.44 floppy drives; our exclusive Omnkey/102 keyboard; high resolution 14" flatscreen amber or white monitor and MS-DOS 4.01.

PLUS...Northgate makes available a wide range of options. We'll build your Northgate your Way and you will be amazed at our "No Baloney" pricing.

NORTHGATE'S 286/20 handles even large databases faster than other systems *Infoworld* (11/14/88) tested, including Dell. Plus it has a full size case and 1MB usable RAM. Doesn't waste 384K of RAM as many others do with shadowing methods.

OUR 286/16, with speed to spare, comes with a second Megabyte of RAM at no extra cost. Even with extra RAM it's hundreds below competition offers with the same features.

THE 386/16 blows right past 16-bit SX systems to true 32-bit 386 Computing Power. Imagine, a power computer with 68 MB of FAST hard drive storage at this incredibly low price! (And compare prices with Compaq's SX.)

Which one is best for you? Either way you'll get Northgate's industry-leading performance, quality.

If One of These is Not For You... Ask about Northgate's 286/12 that was awarded PC Magazine's "Editor's Choice" (1/31/89). Or Northgate's 386/20, top of the line!

Phone Now...Let Northgate begin building your computers...Today!

1-800-548-1993

Hours M-F 7am-8pm CST, Sat. 9am-3pm CST
New Canadian Toll-Free Order Hotline 1-800-338-8383



TERMS: VISA, MC, COD, Credit Card, Pre-Payment (allow 2 weeks for personal checks to clear), Wire Transfer and Purchase Orders for Rated Accounts. We also ship to APO and FPO. All shipments are F.O.B. Minneapolis, MN.

For corporate, government and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-7591.



13895 Industrial Park Blvd., Suite 110,
Plymouth, MN 55441
From Foreign Countries call:
Corporate Headquarters (612) 553-0111 • FAX (612) 553-1895

PROTECT YOUR COPIES OF PC MAGAZINE

Make your collection of *PC Magazine* a handsome addition to your office or home—and protect and organize your copies for easy reference!

PC Magazine Binders and Cases are made of durable, luxury-look leatherette over quality binder board. Custom designed for *PC Magazine*, every order receives FREE transfer foil to mark dates and volume numbers.

**FOR FAST SERVICE CALL
TOLL-FREE 1-800-972-5858**

MAGAZINE BINDERS

Hold your issues on individual snap-on rods. \$9.95 each; 3 for \$29.95; 6 for \$52.95.



OPEN BACK CASES

Store your copies for individual reference. \$2.95 each; 3 for \$21.95; 6 for \$39.95.



PC MAGAZINE

499 East Erie Avenue • Philadelphia, PA 19134

Please send ☐ Binders ☐ Cases Quantity _____

Payment enclosed \$_____. * Add \$1 per case/binder for postage & handling. (Outside USA, add \$2.50 per case/binder ordered, US currency only.)

Charge my:

☐ Amex ☐ Visa ☐ MC (Minimum order \$15.)

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____

Please Print Full Name

Address _____

No. 70 (Six Number Place)

City _____

State _____ Zip _____

*PA residents add 6% sales tax.

■ SPREADSHEET CLINIC

	A	B	C	D	E
1	\t	{Let TIME,@NOW-@INT(@NOW)}			
2		/ppohX(Esc)@|			
3		{Contents NEXT,TIME}			
4	NEXT				
5		{BS}~qagq			
6					
7	TIME				
8					

Figure 4: This macro inserts the current time into the footer of a 1-2-3 worksheet.

	A	B	C	D	E	F	G
1	\t	{Let TIME,@NOW-@INT(@NOW)}					
2		/ppohX(Esc)@|					
3		{Contents NEXT,TIME,9,120}					
4		{If @LEFT(NEXT,1)~"0"}{Let NEXT,@MID(NEXT,1,8)}					
5	NEXT						
6		{BS}~qagq					
7							
8	TIME						
9							

Figure 5: This macro is an alternative version of the one shown in Figure 4.

pressed Enter to complete the /Print Printer Options Header command, the characters in that label will be appended to the end of the header. For example, if NEXT contained the label '06:00 PM at this point, 1-2-3 would type 06:00 PM to the right of the characters @ | |, creating the header @| | 06:00 PM.

Once the macro has added the current time to the header, it will evaluate the final statement in the macro. This commands 1-2-3 to lock in the header and quit from the Options menu. 1-2-3 will then print the worksheet and quit back to the READY mode. —Marty Cuerton; Castle Rock, Colorado

This macro works well. 1-2-3 recalculates @NOW only a fraction of a second before it begins printing a report, so the time that appears at the top of a page is almost the exact time at which 1-2-3 begins printing. One drawback of this macro, however, is that since 1-2-3 does not "recalculate" the header prior to printing each page, the same time will appear at the top of every page of a report.

If you wish to do so, you can change this macro in any of the following ways: First, since combined date and time values appear in time form when assigned time formats, you can replace the argument of the {Let} statement in cell B1 with the

function @NOW. Second, you can add the optional arguments 9 and 120 to the {Contents} command in cell B2. This way, the macro will work correctly no matter what format is assigned to TIME or how wide that cell is. Last, you can insert the statement

```
B4: *{If @LEFT(NEXT,1)~"0"}{Let NEXT,
@MID(NEXT,1,8)}
```

between the statement in cell B3 and the cell named NEXT. This strips the leading 0 (if there is one) from the beginning of the label in NEXT. Figure 5 shows this revised macro.

Of course, you can use this same technique to enter the current time into a footer. To do this, you would simply replace the letter h within the statement in cell B2 with the letter f.

Contribute to the Clinic

Share your latest spreadsheet discovery through Spreadsheet Clinic. We'll pay \$50 or more for tips we print, plus an extra \$25 if you submit your letter on a disk. If you do, please include a printed copy. Mail contributions to Spreadsheet Clinic, *PC Magazine*, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section).

bedford
Accounting Software

BEDFORD ACCOUNTING

(Bedford Software)

"The Perfect System for your Growing Business."
BEDFORD ACCOUNTING is a completely integrated accounting system that includes General Ledger, Payroll, Accounts Receivable, Accounts Payable, Inventory and Job Cost. Use each module as an independent software package... or combine modules to form your completely

coordinated accounting package.

BEDFORD allows for greater flexibility in your reports, supports a completely user defined chart of accounts, manual or computer produced checks (even for payroll), keeps track of full or partial payments by customers, allows you to make full or partial payments to vendors, and offers quick pop-up capability to let you look up accounts and inventory information.

The BEDFORD ACCOUNTING SYSTEM was judged to be PC Magazine's Editors' Choice in a review of 39 accounting packages conducted by Price Waterhouse. "This is truly a complete accounting system. Bedford's six modules... are easy to install, easy to use, and so well integrated with one another that it makes accounting a snap—even for non-accountants."

BEDFORD ACCOUNTING...IBM VERSION.....\$249

BEDFORD ACCOUNTING...MACINTOSH VERSION.....\$249

Also available:

Peachtree Complete Accounting.....\$159 Dac Easy Accounting.....\$ 79

LANDLORD/LANDMASTER

(Systems Plus)

"A Complete Property Management System—Easy to Use with Outstanding Flexibility."

The LANDLORD is a complete property management system that prints tenant statements, generates lease expiration lists, identifies late payers, produces vacancy reports, prints checks and performs all functions required by landlords and anyone who manages apartments, condominiums, shopping centers or any commercial properties...
\$595

The LANDMASTER contains all the features of the LANDLORD plus adds a complete double entry accounting system to the package for general ledger, accounts receivable and accounts payable...\$1250.

TOTAL
PROPERTY
MANAGEMENT

FORMWORX (Formworx)

"Create Any Business Form Instantly"
"The best package we've seen for generating forms"...Compag Magazine... "faster, easier to learn, and more versatile than the competition."

FORMWORX lets you create any form instantly. Using FORMWORX's advanced drawing tools, you can draw vertical and horizontal lines, boxes with dots, dashes or solid lines of various widths...add heading and text using a variety of type sizes and styles...and complete your form by adding any of 95 graphics fill patterns including shading and borders. FORMWORX outperforms all of the competition.

FORMWORX WITH FILL and FILE makes FORMWORX into the most advanced productivity tool on the market. Now, you can actually make form overlays and fill in all the blanks on your form. Save it, recall it, perform automatic mathematics and recalculations on your form...and, if you use dBASE, it's totally compatible.

FORMWORX.....\$99.95 FORMWORX WITH FILL & FILE.....\$149.95

FORMKITS (70 or more professionally designed templates/package)

Business Forms.....\$39.95 Personnel Forms.....\$39.95

Time Management Forms.....\$39.95 Project Management Forms.....\$39.95

Sales & Marketing Forms.....\$39.95 Graphics & Charts.....\$39.95

READY TO RUN ACCOUNTING

WITH LOTUS 1-2-3
(Manusoft)

"The Full-Featured Accounting System that Runs Under 1-2-3."

A completely integrated, full-featured, easy-to-run accounting system that works under full control of Lotus 1-2-3. Purchase individual modules or the complete system.

General Ledger.....\$69.95 Payroll.....\$69.95

Accounts Receivable.....\$49.95 Accounts Payable.....\$49.95

Inventory Control/Order Entry.....\$69.95

Complete System (all 5 modules).....\$199.95

SUPPORTS
BAR CODE
READERS

MICROBIZ RETAIL STORE/CASH REGISTER CONTROL

(Microbiz Corporation)

The MICROBIZ RETAIL STORE SYSTEM is an extraordinary system for managing all retail store sales, customers and inventory. Quickly bill your customers, keep track of your inventory, commissions, look up prices, print cash register receipts (or complete invoices) and perform all the day-to-day functions required to keep you on top of your business and its cash flow. It's time to computerize.....all for \$395.

Optional add-ons to your Retail Store Software System...a complete cash drawer that plugs into your IBM PC or compatible, a receipt printer and bar code reader.

Systems are also available for Video Stores, Beauty Salons, Liquor Stores, Auto Repair Shops and other vertical markets.

Retail Store/Computer Cash

Register Software.....\$399 Video/Liquor Store Management.. \$795

Bar Code Reader for Above.....\$595 Beauty Salon Accounting.....\$795

Cash Drawer for Above.....\$495 The Auto Repair Shop Controller.....\$795

TIMESLIPS III

(North Edge Software)

"The Professional Time and Billing System for Anyone Who Must Bill for Time and Service... used by more accountants, lawyers, doctors, consultants and other professionals than any other billing system."

It's unanimous. All the reviewers agree that TIMESLIPS III is the best time and billing system on the market...and certainly equal to or better than packages selling for \$2000 and up. TIMESLIPS received one of INFOWORD'S best ratings ever (9.3).

TIMESLIPS is memory resident, offers a pop-up "stopwatch" to time phone calls and activities, generates transaction reports, client history, aged receivables and many valuable management reports. It interfaces with many software programs such as Bedford, Peachtree and DAC. You may even export data to Lotus 1-2-3 and dBASE. CREATE THE PERFECT BILL with TIMESLIPS III.

TIMESLIPS III (for hard disk drive systems).....\$114.00

TIMESLIPS III (for floppy systems).....\$ 97.00

TAL (link TIMESLIPS III to other accounting programs).....\$ 79.95

We are the experts in accounting software. Choose from over 100 accounting packages, and vertical market packages. Call for great values on DAC EASY, PEACHTREE and more than 100 other business, accounting and vertical market packages.

Please call or write for our FREE 48 page full color catalog containing more than 100,000 hardware and software items ready to be shipped. All prices and specifications are subject to change. Delivery subject to availability.

Add \$6 for shipping of the first item (\$3 for each additional item).

CIRCLE 301 ON READER SERVICE CARD

HANSON & CONNORS'

PC EXCHANGE™*

1-800-DIAL-PCX

30 DAY
MONEY BACK
GUARANTEEOVERNIGHT SOFTWARE DELIVERY
*Formerly PC EXPRESS(That's 1-800-342-5729)
All prices subject to change.
Delivery subject to availability.7 ZEL PLAZA
SPRING VALLEY, NY
10577PHONE: (914) 426-2400
FAX: (914) 426-2500
TELEX: 667962 (SOFT COMM NYK)

True CPU Power.



State of the art power usually comes with a state of the art price. Except at Computer Products United. At CPU, we design compatibles to extend the limits of technology and reliability. Not the limits of your budget.

Consider our 386/25. It gives you the performance of a real 80386-25. Not just a 20 trying to run like a 25. In addition, to get the most out of your standalone applications, we offer MS-DOS® and MS® OS/2 support.

386/25 \$3,295

- 80386-25 CPU running at 25MHz
- 32K cache memory
- Zero wait state, Norton V3 SI rating: 29.7
- 1 MB memory (expandable to 8 MB using SIMM on board)
- 384K shadow RAM
- 1.2 MB floppy disk drive
- 1:1 interleave dual floppy/hard disk controller
- Ports: 2 serial, 1 parallel, 1 game
- Clock/calendar with battery backup
- 101-key enhanced keyboard
- AMI/Award BIOS
- CPU/80387 math co-processor socket
- 8 expansion slots

386/20 \$1,995

If you need a few workstations to plug into your LAN, a fileserver that can handle a bigger load, or a complete turnkey network package complete with NetWare®, CPU is your single-source answer offering all the security of our Novell Gold-authorized support.

For state of the art technology at a hands-on price, CPU is an exceptional value. With no exceptions.

- 80386-20 CPU running at 20 MHz
- Zero wait state, Norton V3 SI rating: 23
- 1 MB memory (expandable to 8 MB using SIMM on board)
- 384K shadow RAM
- 1.2 MB floppy disk drive
- Dual floppy/hard disk controller
- Ports: 2 serial, 1 parallel, 1 game
- Clock/calendar with battery backup
- 101-key enhanced keyboard
- AMI/Award BIOS
- 80287/80387 math co-processor socket
- 8 expansion slots
- 64K cache memory system, \$2395

Unbelievable CPU Prices.



386SX

\$1,695

- 80386SX CPU running at 16MHz
- Zero wait state, Norton V3 SI rating: 18.7
- 1 MB memory (expandable to 8 MB using SIMM on board)
- 384K shadow RAM
- 1.2 MB floppy disk drive
- Dual floppy/hard disk controller
- Ports: 2 serial, 1 parallel, 1 game
- Clock/calendar with battery backup
- 101-key enhanced keyboard
- Award BIOS
- 80387SX math co-processor socket
- 8 expansion slots

286/20

\$1,295

- 80286 CPU running at 20MHz
- Zero wait state, Norton V3 SI rating: 23
- 512K memory (expandable to 4 MB using 1 MB DRAM on board)
- 384K shadow RAM feature
- 1.2 MB floppy disk drive
- Dual floppy/hard disk controller
- Ports: 2 serial, 1 parallel, 1 game
- Clock/calendar with battery backup
- 101-key enhanced keyboard
- Phoenix BIOS
- 80287 math co-processor socket
- 8 expansion slots



286/12

\$995

- 80286-12 CPU running at 12MHz
- Zero wait state, Norton V3 SI rating: 15.3
- 512K memory (expandable to 4 MB using SIMM on board)
- 1.2 MB floppy disk drive
- Dual floppy/hard disk controller
- Ports: 2 serial, 1 parallel, 1 game
- Clock/calendar with 10 year battery life
- 101-key enhanced keyboard
- Phoenix/Award BIOS
- 80287 math co-processor socket
- 8 expansion slots

 **NOVELL**
Gold-Authorized Dealer

To order,
call (800) 824-2936.
In California: (800) 662-6111.
Local inquiries: (818) 338-5959.

Hours: Monday through Friday 7 a.m. to 6 p.m.;
Saturday, 10 a.m. to 3 p.m. PST.

All systems carry a 30-day money-back guarantee excluding shipping charges. All basic systems carry a comprehensive 1 year parts and labor warranty. During this period, we will repair or replace, at our option, any defective part at no additional charge. Add-on products (hard drives, monitors, etc.) carry manufacturers' warranties.

We accept VISA, MasterCard, and cashiers' checks. Purchase orders and personal checks welcome.



**Computer
Products
United**

12803 Schabrum Avenue, Irwindale, CA 91706.

Copyright © 1988 Computer Products United. All rights reserved. Pricing and system configurations are subject to change without notice.

MS-DOS and MS are registered trademarks of Microsoft, Inc. NetWare is a registered trademark of Novell, Inc.

Morgan Steenman & Tuininga

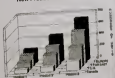
October 27, 1988

Mr. Charles Bostwick
Bostwick Parker Company
13644 148th Avenue
Detroit, Michigan 48464

Dear Mr. Bostwick:

The results of the computer simulation are in, and you'll find them quite fascinating. Here is an interesting surprise: the greatest sales potential exists with number three. What's more, the largest sales will number three. What's more, the largest sales will result from Europe and the Far East, not the United States.

Bostwick Parker Co.
New Product Sales Projections



These sales projections take into account the requested in the model. Specifically, the requested in the model was reduced to reflect the

Morgan Steenman & Tuininga

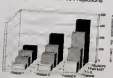
October 27, 1988

Mr. Charles Bostwick
Bostwick Parker Company
13644 148th Avenue
Detroit, Michigan 48464

Dear Mr. Bostwick:

The results of the computer simulation are in, and I think you'll find them quite fascinating. Here is an interesting surprise: the greatest sales potential exists with product number three. What's more, the largest sales will result from Europe and the Far East, not the United States.

Bostwick Parker Co.
New Product Sales Projections



These sales projections take into account the requested in the model. Specifically, the requested in the model was reduced to reflect the

CAN YOU SPOT THE \$700 DIFFERENCE?

One of the nearly identical samples you see above was printed with the HP Laserjet Series II. The other is from the Mannesmann Tally® MT905. Both are reprinted here exactly as they came out of the printers.

But what might surprise you is the rather dramatic difference in the manufacturers' suggested retail prices.

The Mannesmann Tally laser is \$700 less. Yet it offers the same high quality output, lowers operating costs 25 percent, and prints at six pages per minute.

The MT905 comes with the same resident type fonts as HP, accepts standard HP font cartridges, and lets you choose optional memory upgrades from one to four megabytes.



MT905 Specifications

- Technology: scanning laser.
- Print Speed: 6 pages per minute.
- Resolution: 300 x 300 dpi.
- Emulations: HP Series-II, [optional emulations: Epson®, IBM® Proprinter, & Diablo 630.]
- Standard I/Os: Serial & parallel.
- Memory: 512K. [upgrades: 1, 2, & 4 megabytes.]
- Typefaces: Courier medium & bold, line printer, accepts standard HP font cartridges or any downloadable font in HP-format, 6-resident fonts + 2 font cartridge slots.
- Paper Handling: 250-sheet input & output bins. Manual feed handles single sheets, envelopes, transparencies, and labels.
- Workload: 4,000 pages-per-month.
- Suggested Retail: \$1,995.

For more convenient paper handling, the universal paper cassette holds letter, legal, and international sizes, plus up to 15 standard envelopes. You can choose face-down output to keep long documents in the right order. And the manual feed lets you print labels or transparencies.

So any way you figure, the answer still comes up the same. The Mannesmann Tally laser looks perfect. And so does the price.

For the name of your nearest dealer, call the toll-free number listed below.

**MANNESMANN
TALLY**

1-800-843-1347

Ext. 323

Epson and IBM are registered trademarks.

■ NEIL J. RUBENKING

USER-TO-USER



Maximize free memory with an alternative AUTOEXEC; display your computer's ID with a batch file; use ANSI escape sequences to create hard disk menus.

Track your bootups with an undocumented feature of CTTY

If you have an extensive AUTOEXEC.BAT file like I do, you are probably tired of seeing the same messages scroll past every time you boot your computer. Adding CTTY NULL to the beginning of your AUTOEXEC file would redirect console output and no messages would be sent to your screen. But this would also mean that you wouldn't see any error messages.

A better idea is to redirect the screen to a file that you can type out later. For example, to send all console output to the file AUTOEXEC.LOG, simply add

```
CTTY > AUTOEXEC.LOG
```

to the beginning of your AUTOEXEC.BAT file. Then if something does go wrong at boot time, you can use TYPE or a word processor to view the AUTOEXEC.LOG file. This is also great for those times when error messages flash by so fast that you don't have time to read them.

If you don't like a blank screen while booting, add

```
ECHO Please wait while system starts up
```

before CTTY > AUTOEXEC.LOG. This will let users know what is going on.

One final note, be sure to add

```
CTTY CON
```

to your AUTOEXEC.BAT to return the console to normal. Put it before any command that requires operator input.—Douglass Hemminger; Elyria, Ohio

CTTY > AUTOEXEC.LOG may look like ordinary redirection, but it definitely is not. The fact that it works at all is directly contrary to the DOS manual. The manual states that CTTY must be followed by a valid device name, and that redirection is not supported. Despite the manual, you can redirect CTTY this way in DOS 2.0 to 3.3. The first line of your output will always be an error message from CTTY itself: "Invalid device."

The technique works, but you're using a DOS bug, not a DOS feature. Don't try to use it under DOS 4.0.

Build a hard-disk menu system with ordinary DOS tools

I've used many menu programs for hard disks, but the best menu system is one I made using batch files, ANSI escape sequences, and function keys. By using generic names for the batch files, I can use the same keys in any directory of my hard disk, making my system very easy to access. The first line in my AUTOEXEC.BAT file is

```
PROMPT $e{0;59;"F1";13p
```

where \$e{ . . . p indicates an ANSI key redefinition, 0;59; is the scan code for redefining the F1 key, 'F1' is the text string "F1", and 13 is the code for Enter.

In this example, the F1 key is redefined from its default value and now has a value of "F1" followed by Enter. When you press the F1 key, the computer looks for a

file called F1 with a .BAT, .EXE, or .COM extension. It finds F1.BAT, which reads

```
ECHO OFF
CLS
CD GAMES
TYPE GAME.TXT
```

GAME.TXT is another menu. If you pressed F1 again you'd call a batch file named F1.BAT in the GAMES directory.

This will not interfere with any programs that use function keys to operate. The programs will take the keys and then, after you exit the program, restore them to the values you set.

The chart in Figure 1 shows the codes for function keys 1 through 10.—Daniel Ullman; Seattle, Washington

PC Redefining Function Keys	
Function key	Key scan code
F1	59
F2	60
F3	61
F4	62
F5	63
F6	64
F7	65
F8	66
F9	67
F10	68

Figure 1: To redefine the ten function keys, substitute the scan code listed next to the key in the expression PROMPT \$e{0;...;"F...";13p. For example: PROMPT \$e{0;67;"F9";13p.

Do You Believe Software Can Make A Computer Faster?

The Editors Do!

For years minicomputers have used software techniques to improve the throughput of peripherals. Now Multisoft has developed a complete set of utilities based on these techniques to provide:

- faster disk access
- faster output to printers
- faster keyboard repeat rates
- faster video speeds

Nothing could be easier. A quick installation, a warm reboot, and from that moment on you will see what your computer can really do.

PC-Kwik Power Pak is a set of performance utilities that will amaze you in its power and simplicity. Power Pak contains Super PC-Kwik, the disk cache PC Magazine named its Editor's Choice.

Super PC-Kwik

"In overall performance, Multisoft's \$79.95 Super PC-Kwik roared into first place in the PC Labs benchmark tests."

"When you combine it with the RAM disk,

print spooler, and other programs in Multisoft's PC-Kwik Power Pak, Super PC-Kwik makes better use of your memory than any other cache you can buy."

Order Super PC-Kwik today and see what the industry's best disk cache can do for you, or get the most for your money with our 5-in-1 Power Pak.

Super PC-Kwik \$79.95
Power Pak \$129.95

30-day money-back guarantee



MULTISOFT CORPORATION
15100 SW Koll Pkwy, Suite L
Beaverton, OR 97005
800-444-KWIK
503-644-5644

■ USER-TO-USER

```
ECHO OFF
PATH C:\MENU;C:\DOS
PROMPT $e[0;59;"F1";13p
PROMPT $e[0;60;"F2";13p
PROMPT $e[0;61;"F3";13p
PROMPT $e[0;62;"F4";13p
PROMPT $e[0;63;"F5";13p
PROMPT $e[0;64;"F6";13p
PROMPT $e[0;65;"F7";13p
PROMPT $e[0;66;"F8";13p
PROMPT $e[0;67;"F9";13p
PROMPT $e[0;68;"F10";13p
PROMPT $P$G
ECHO OFF
CLS
REM FKEYMENU.TXT is a file that you will create
REM to describe what each function key does.
TYPE \MENU\FKEYMENU.TXT
```

Figure 2: FKEYMENU.BAT illustrates how you can build a generic menu. What you put in files F1.BAT through F10.BAT will determine what this menu does.

The final comment about other programs using function keys isn't quite correct. Programs that use DOS to get input will be affected by the key redefinitions. However, all major applications read the keyboard in a more sophisticated way. They don't take away the key definitions and restore them—they simply ignore them.

If you normally load ANSI.SYS in your CONFIG.SYS file, this is a painless way to make yourself a menu. Note that since it defines each function key as "F?" (where ? is the number), it will always search the current directory first for a matching file. This means you can create submenus simply by having the F?.BAT file change to another directory that also contains F?.BAT files.

FKEYMENU.BAT in Figure 2 uses this technique. It assumes that you have a subdirectory called \MENU in which you store your F?.BAT files and the menu text. By putting C:\MENU on the PATH, you make the F?.BAT files available from any directory. However, local F?.BAT files in the current directory will supersede them. That's convenient!

Create a batch file that displays your machine's ID

Our school uses a mix of Tandy 1000 EXs and Cordata CS 40s hooked to various printers. Since beginning students can

never remember to use the correct .BAT file, we needed a way to set the correct printer definition based on the machine they were using.

ID.COM is called in a batch file, finds the machine ID and sets the ERROR-LEVEL. The batch file tests the ERROR-LEVEL and branches accordingly.

The machine ID for most PCs and compatibles can be found by starting DEBUG and typing

```
D F000:FFFE L 1<ENTER>
```

This will display two letters, which represent the machine ID in hex:

```
IBM PC, Tandy 1000 0F7h (255)
IBM PC XT, Cordata CS40 0F2h (254)
```

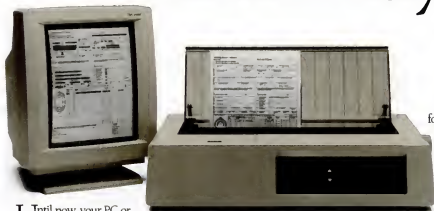
The machine IDs would need to be different for this to work. Since we have two

```
N ID.COM
RCX
C
A 100
MOV AX,F000
MOV DS,AX
MOV AL,[FFFE]
MOV AH,4C
INT 21

W
Q
```

Figure 3: Pass this script as input to DEBUG to create ID.COM.

Fill out your forms automatically. Build your database simultaneously.



Until now, your PC or PS/2* has offered little help in solving a major paperwork problem—forms fill-in. Now, there is DisplayForm II® the forms problem solver software from Deerfield Systems.

With DisplayForm II you can create dBaseIII+™ compatible files simultaneously as you fill-in forms automatically. You can also merge information from dBase® or ASCII files during fill-in, edit, and print operations. So you not only gain productivity when a form is filled in, but also gain control of the information you create.

Setting up a form with DisplayForm II is simply a matter of scanning the pre-printed form to get a PC Paintbrush®.PCX file, compressing it to fit the system monitor type, then locating fields and establishing data entry criteria. No time-consuming tracing or re-drawing steps are needed. Your operators can see the form right on the monitor screen— even on a full page display (The Genius®)—where it can easily be filled in. If you don't have a form, or want to change an existing form, use DisplayForm II's built-in

form creation/draw package.

DisplayForm II includes many more benefits and optional features for simply filling out a single form

or for solving your toughest forms handling problems: Powerful data entry capabilities with arithmetic calculations. A screen/FAX option to send a form directly from the screen. Support for printing text alone to most printers, or text plus image to graphics printers. The ability to run standalone or on a network, and lots more.

DisplayForm II offers power and performance beyond any other package on the market today. It runs without special hardware, yet can accommodate higher quality monitors and printing devices.

For more information, or to order, call the forms problem solving experts at Deerfield Systems 1-800-356-8170, or write Deerfield Systems, Inc., 221 Elizabeth Street, Utica, NY 13501. Major credit cards.

DisplayForm II
DEERFIELD SYSTEMS



For only \$495 you get it all: form set-up, fill-in, edit, print, and forms creation capability.

DisplayForm II is a trademark of Deerfield Systems, Inc. dBase and dBase III+ are trademarks of Ashton-Tate Corporation. PS/2 is a trademark of IBM Corporation. The Genius is a trademark of Micro Design Systems, PC Paintbrush is a trademark of ZSoft Corporation.

CIRCLE 385 ON READER SERVICE CARD

■ USER-TO-USER

```

BCMO OFF
ID
SET ID=unknown
FOR %a IN (48 49 50 51 52 53 54 55) DO IF ERRORLEVEL 2%a SET ID=2%a
GOTO ID24
:255
BCMO PC
GOTO end
:254
BCMO PC XT (early)
GOTO end
:253
BCMO PCjr
GOTO end
:252
BCMO AT -or- XT-286 -or- 386 model 58 and 41
GOTO end
:251
BCMO XT (later)
GOTO end
:250
BCMO PS/2 model 38
GOTO end
:249
BCMO PC convertible
GOTO end
:248
BCMO PS/2 model 78 and 88
GOTO end
:unknown
BCMO Unknown machine type
end
BCMO The machine ID code is now available for use in your
BCMO other batch files -- in the environment variable ID.

```

Figure 4: GET_ID.BAT names your machine type and leaves the ID byte accessible in the environment variable ID.

different brands of computers with different IDs, it does.

To create ID.COM, type in the script in Figure 3 with a pure ASCII text editor. Be sure to hit the Enter key at the end of each line, and also to include the blank line before the W line. Then get back to DOS and type

DEBUG < GET_ID.SCR

to create the file. The batch file in Figure 4

shows a sample application.—Dennis Landis; Orrville, Ohio

The ID bytes can have eight values, from F8h (248) through FFh (255), with each value representing one or more machines.

Figure 4 is a batch file that displays the machine names associated with your computer's ID byte. One of the machine ID codes seems overloaded—FCh (252) is the ID for 4 different computers. On machines

with an AT or PS/2 BIOS, you can call interrupt 15h, function C0h to get the "sub-model byte" that distinguishes among these machines. But the simple ID program presented here will at least distinguish between the eight main ID bytes.

I simplified the original ID.COM to make it return the computer ID bytes exactly. This way, if new machines appear with new ID values, ID.COM won't have to change.

METRO IMAGEBASE[™]

ELECTRONIC ART.

Professional-quality, high-resolution electronic art for serious desktop publishers.

- Professional-quality art created by leading illustrators.
- More than 4 times sharper than typical "clip art".
- One large image per file for easy manipulation.
- 100 usefully grouped images per package.
- Guaranteed satisfaction or your money back.

100 images per package
300 dpi resolution
\$145 per package

METRO

IMAGEBASE
The Art of Electronic Publishing

Works with: PageMaker, Ready,Set,Go!,
Ventura Publisher, XPress,
Cricket Paint and WordPerfect 5.0.

File Format: All Macintosh and MS-DOS PageMaker
disks use .TIF. Ventura Publisher disks use .PCX and
WordPerfect 5.0 disks use .IMG.

System Requirements:

Computer: Macintosh 512K, Plus, SE, II and IBM systems
configured for desktop publishing.

Storage: A hard-drive is strongly
recommended.

Printer: Laser Printer

For information call 1-800-525-1552, Fax (818) 881-4557
(Outside U.S. (818) 881-1967). Metro ImageBase, Inc.,
19625 Ventura Blvd., Suite 210, Tarzana, CA 91356



NewsletterMaker
Pictures that really make
headlines. Seasonal, edu-
cational, holiday and
sports. Images to illustrate
almost any occasion.



Computers & Technology
Images of people comput-
ing, monitors and
keyboards, satellites and
astronauts, research
laboratories and more.



Borders & Boxes
Decorative signs,
symbols, curtains, borders,
borders and more. For
framing any document.



Business Graphics
Serious and not so serious
images to work with
Officers and office equip-
ment, managers and meetings,
and financial symbols.



ReportMaker
Political, social, indus-
trial, agricultural and
financial symbols. Images
to give your reports
more impact.



Food
A generous serving of
images. From soup to
nuts, waffles and chefs,
banquets and barbecues,
borders and more.

The Four Seasons
Art Deco

Other available packages:

People Team Sports
Weekend Sports Nine to Five
Exercise & Fitness Travel

Money-Back Guarantee

If you are not completely satisfied with the selection of images, return the
complete package within 10 days for a full refund.

To order call toll-free: 1-800-525-1552



Federal Express[®] overnight delivery
(available on request)



Metro ImageBase, Inc.

18623 Ventura Blvd. Suite 210, Tarzana, CA 91356

1-800-525-1552, Fax (818) 881-4557

PCM-480

Copyright © 1988 Metro ImageBase, Inc. All rights reserved. Metro ImageBase and The Art of Electronic Publishing are trademarks of Metro ImageBase, Inc. All other trademarks are the property of their respective owners. Metro ImageBase, Inc. is a registered trademark of Metro ImageBase, Inc. All other trademarks are the property of their respective owners. Metro ImageBase, Inc. is a registered trademark of Metro ImageBase, Inc. All other trademarks are the property of their respective owners. Metro ImageBase, Inc. is a registered trademark of Metro ImageBase, Inc. All other trademarks are the property of their respective owners.

Use an alternative AUTOEXEC to maximize free memory for RAM-hungry programs

Occasionally, I use programs that are too big to fit in memory. Even with 640K of RAM, much of my memory is used by TSR programs invoked by AUTOEXEC.BAT and by large device drivers (for example, a RAMdisk) in CONFIG.SYS. PC Magazine's INSTALL.COM and REMOVE.COM are excellent for managing TSR programs, but the device drivers in CONFIG.SYS can use too much memory.

To free up all the RAM I can, I developed a batch file that renames AUTOEXEC.BAT and CONFIG.SYS, and prompts me to reset the system. The new AUTOEXEC.BAT file restores the original files, but until you reboot, DOS is the only thing still in RAM. The prompt indicates that RAM has been maximized, and I can

```
ECHO OFF
REM -----THIS WORKS WITH THE FILE MAXRAM.MAX
IF NOT EXIST CONFIG.MAX GOTO RENAMER
DEL AUTOEXEC.BAT
RENAME AUTOEXEC.MAX AUTOEXEC.BAT
RENAME CONFIG.MAX CONFIG.SYS
CLS
ECHO      MAXRAM has renamed AUTOEXEC.BAT and CONFIG.SYS.
ECHO      The system will be normal when it is reset.
GOTO END
:RENAMER
RENAME AUTOEXEC.BAT AUTOEXEC.MAX
RENAME CONFIG.SYS CONFIG.MAX
COPY MAXRAM.MAX AUTOEXEC.BAT
CLS
ECHO      MAXRAM has renamed AUTOEXEC.BAT and CONFIG.SYS.
ECHO      The maximum amount of memory will be available
ECHO      when the system is reset.
ECHO      +
ECHO      Reset the computer now
ECHO      CTRL + ALT + DEL
PROMPT Press Ctrl-Alt-Delete NOW!
:END
```

Figure 5: MAXRAM.BAT sets up your computer to reboot with maximum free RAM.

IS YOUR FILE THE ONE THAT GOT AWAY?

Nothing is more frustrating than losing important files. Your best protection against catastrophic data loss is using Point-And-Shoot PC-FullBak. We can solve your backup problems with the fastest, easiest, and most reliable backup utility on the market.

FAST! Point-And-Shoot PC-FullBak gives you blazing backup speed on your IBM PC, XT, AT, PS/2 30, 50, 60, 80, 80386 or true hardware compatible at up to 25 mhz!

SIMPLE! Just use the light-bar menu to select and mark the files you want to back up! Back up data all over your hard-disk with a single command!

RELIABLE! Point-And-Shoot PC-FullBak keeps your data safe—but don't take our word for it: "The product has never failed to give me a reliable RESTORE."—Jim Seymour, *Micro Business*

"Quick, clean, fast and is heartily recommended!"—Marvin Bryan, *PC Week*

"It's made a chore that usually takes 45 minutes into a 7-minute walk in the park."—Anthony W. Czarnik, Ohio University

WHY WAIT? Get Point-And-Shoot PC-FullBak NOW—before your valuable data decides to swim away! Visit your local quality software dealer, or order by phone at (512) 328-1041. Your satisfaction is guaranteed—or we'll refund your money! **\$129.95**

And that's no fish story.



P.O. Box 1711, Austin, TX 78767
Telephone: (512) 328-1041

AWARD-WINNING SOFTWARE!

The award-winning family of products from Westlake Data Corp. has received PC Magazine's Editor's Choice Award and has been nominated for PC Magazine's Technical Excellence Award.

**WESTLAKE
DATA CORP**

CIRCLE 485 ON READER SERVICE CARD

■ USER-TO-USER

then run my large programs. The next time I reset the system, I will have the use of my TSR programs and RAMdisk, and everything is back to normal.

MAXRAM.BAT in Figure 5 and MAXRAM.MAX in Figure 6 work together. MAXRAM.BAT does all file renaming and MAXRAM.MAX replaces AUTOEXEC.BAT.—David F. Hill; Austin, Texas

I use a very similar technique to manage conflicting EMS drivers—loading a different one requires me to switch to a different CONFIG.SYS and reboot. In order to make sure I don't get distracted and forget

to reboot, I change the prompt to a reminder. I've added this feature to MAXRAM.BAT.

If you do use a system like MAXRAM, be sure to keep spare copies of your AUTOEXEC.BAT and CONFIG.SYS, and keep the copies up to date. It's always possible that something untoward could happen and you could lose your AUTOEXEC.BAT.

Productivity Tip

The REPLACE command (introduced in DOS 3.2) lets you update files on one disk

with their newer versions from another disk. Suppose you copied three floppy disks to a single hard disk directory and made changes to the files on the hard disk. You can automatically copy only the updated files back to the appropriate floppy with the command

```
REPLACE *.* A:
```

Share Your Secrets

Reveal your latest DOS and systems discoveries through User-to-User. We'll pay you \$50 or more for any submissions we print, *plus an extra \$25 if you send your letter on-disk*. If you do, please include a printed copy. Mail contributions to User-to-User, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section).

ECHO OFF

```
REM -----THIS WORKS WITH THE FILE MAXRAM.BAT
```

```
CLS
```

```
PROMPT MAXRAM $P$G
```

```
MAXRAM
```

Figure 6: MAXRAM.BAT replaces AUTOEXEC with this file, MAXRAM.MAX.

CO/SESSION™ IS THE FASTEST, EASIEST, MOST POWERFUL REMOTE COMPUTING SOFTWARE!

Remote PCs need no longer remain remote with the powerful new features of CO/SESSION 3.1. CO/SESSION is the ideal solution for all your PC communication needs.

HOME COMPUTING Use CO/SESSION to work at home and run your office PC as if you were there. Access files, execute DOS commands, run programs, print reports and more.

CUSTOMER SUPPORT Provide on-site support and training to customers without moving an inch. CO/SESSION allows you to work with remote users as if you were there.

NETWORK ACCESS Link remote users and offices to your network and enjoy on-line access to all the network resources.

FILE TRANSFERS Transfer files by modem or direct cable. CO/SESSION is ideal for laptops, home and remote offices!

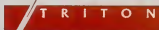


AUTOMATED SESSIONS Add the ability to automate and schedule file transfers, printing and running of programs on remote PCs with SESSION/XL.

BETTER THAN CARBON COPY PLUS CO/SESSION is up to 400% faster, easier to use, more powerful and lockup free. If you're a current Carbon Copy user, ask about our upgrade program. You'll see the difference in minutes.

IMMEDIATE AVAILABILITY Call today for additional information on CO/SESSION and SESSION/XL or visit your nearest dealer and tell them you want the best in remote computing software. CO/SESSION can be purchased in single or two machine licenses.

CALL-201-855-9440
FAX-201-855-9608



Triton Technologies Inc. 200 Middlesex Essex Turnpike Iselin, NJ 08830

■ EDITED BY CRAIG L. STARK

POWER USER



WordPerfect 5.0's advanced macro features give you a great deal of power and flexibility. Here are some useful techniques for creating your own pop-up menus.

WordPerfect 5.0's advanced macros let you create your own pop-up menus and help windows

The advanced macro features in *WordPerfect*, Version 5.0, are seriously underdocumented. It's a shame because when properly applied, they provide a great deal of

extra power and flexibility.

While writing a book on *WordPerfect* macros for Bantam Computer Books, I found that one of the least understood macro features is the {P} display code, which is used to place a message anywhere on the screen. The {P} code is used in {PROMPT}, {TEXT}, and {CHAR} message strings, and it is followed by two

characters. The first character indicates a column position (from 1 to 80); the second character indicates a line position (from 1 to 24). By judiciously calculating the column and line positions, you can produce pop-up menus of any size or shape.

The {P} display code uses either control characters ("A", "B", "C", and so forth), or the IBM Extended Character Set char-

```
{ON CANCEL}{GO}cancel""
{ON NOT FOUND}{GO}not-found""
{LABEL}draw-font-box"
{CHAR}1"
  {P}01..Select-e-font:.....(Enter)
  {P}0A..1..Helvetica.....(Enter)
  {P}0A..2..Helvetica-Bold.....(Enter)
  {P}0A..3..Helvetica-Bold-Oblique.....(Enter)
  {P}0A..4..Helvetica-Narrow.....(Enter)
  {P}0A..5..Helvetica-Narrow-Bold.....(Enter)
  {P}0A..6..Helvetica-Narrow-Bold-Oblique.....(Enter)
  {P}0A..7..Helvetica-Narrow-Oblique.....(Enter)
  {P}0A..8..Helvetica-Oblique.....(Enter)
{HOME}
{LABEL}test-entry"
{IF}{VAR 1}>8"
  {ELSE}
  {GO}wrong-entry"
{END IF}
{IF}{VAR 1}<9"
  {ELSE}
  {GO}wrong-entry"
{END IF}
{GO}draw-size-box"
{LABEL}wrong-entry"
  {LOOK}1"
  {PROMPT}{HOME}"
  {GO}test-entry"
{LABEL}draw-size-box"
  {DISPLAY OFF}
  {DISPLAY ON}
{TEXT}#"
```

```
{P}01..Enter-a-font-size.....(Enter)
{P}0A.....(Enter)
{P}0A.....(Enter)
{P}~K"
{IF}{VAR #}<128"
  {ELSE}
  {GO}wrong-size"
{END IF}
{IF}{VAR #}>3"
  {ELSE}
  {GO}wrong-size"
{END IF}
{GO}choose-font"
{LABEL}wrong-size"
  {BELL}
  {PROMPT}Choose-e-size-between-4-and-127-points..."
  {WAIT}28"
  {GO}draw-size-box"
{LABEL}choose-font"
{DISPLAY OFF}
{CASE}{VAR 1}"
  1"Hel"
  2"Bold"
  3"Bold-oblique"
  4"Narrow"
  5"Narrow-bold"
  6"Narrow-bold-oblique"
  7"Narrow-oblique"
  8"Oblique"
{LABEL}Hel"
{FONT}4nHelvetica(Enter)1{VAR #}(Enter)
{QUIT}
{LABEL}Bold"
```

(continues)

Figure 1: This WordPerfect 5.0 macro uses a pop-up window to prompt for a font selection; it illustrates several advanced macro techniques.

■ POWER USER

```
{Font}4nHelvetica-Bold{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}Bold-oblique"
{Font}4nHelvetica-Bold-Oblique{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}Narrow"
{Font}4nHelvetica-Narrow{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}Narrow-bold"
{Font}4nHelvetica-Narrow-Bold{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}Narrow-bold-oblique"
{Font}4nHelvetica-Narrow-Bold-Oblique{Enter}1{VAR #}{Enter} {QUIT}

{LABEL}Narrow-oblique"
{Font}4nHelvetica-Narrow-Oblique{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}Oblique"
{Font}4nHelvetica-Oblique{Enter}1{VAR #}{Enter}
{QUIT}

{LABEL}cancel"
{DISPLAY OFF}
{DISPLAY ON}
{QUIT}

{LABEL}not-found"
{PROMPT}Sorry, can't find the font..."
{BELL}
{WAIT}15"
{Exit}{Exit}
{DISPLAY OFF}
{QUIT}
```

(Figure 1 ends)

acters (those with an ASCII value of 128 or more). The control character method is not recommended, as it precludes putting the start of the message at some locations on the screen. The better method is to use the Extended Character Set. Enter the appropriate column and line characters by holding down the Alt key and typing a number into the numeric keypad (not the number keys on the top row of the keyboard). For example, to enter ASCII 128, press and hold the Alt key, and type 1 2 8 on the numeric keypad. The Ç character will appear.

You need to identify both the column and line after the {·P} code, so you must enter two codes. The column code goes first, followed by the line code. For example, to position the message at the upper-left corner of the display (ASCII 128 for the column and ASCII 128 for the line), enter

```
{·P}ÇÇ Your message goes here."
```

To determine the proper ASCII number to use for other locations, add 127 to the desired column or line number. To place

the message starting at column 30 and line 15, for instance, use ASCII 157 (127 + 30) and ASCII 142 (127 + 15). In the IBM extended character set these will show on-screen as ¥ (ASCII 157) and Å (ASCII 142).

You can start the message anywhere along the width of the display, up to column 80 (ASCII 207). After that, *WordPerfect* automatically wraps the start of the message onto the next line. Wrapping will also occur if the message extends beyond the 80th column. Additionally, you can start the message along the length of the display up to line 25. Realistically, you would not use the 25th line with the {·P} display code, however, since that's the status line used for *WordPerfect* message prompts.

A pop-up window is composed of separate lines in a {PROMPT}, {TEXT}, or {CHAR} message, and it has the effect of temporarily overwriting any text that's underneath. Once the window is removed from the screen, the original text reappears. By formatting the lines of the message with a box frame, you can make a re-

alistic-looking pop-up window.

By way of illustration, Figure 1 contains a sample macro that displays a pop-up window that allows you to select one of several Helvetica font typefaces (it's for use with a PostScript-compatible laser printer). A second, smaller box prompts for the point size of the font.

Text within the pop-up window is formatted using empty spaces. Each line of the window *must* end with an {Enter} code. Be sure that you use the proper screen locations after the {·P} code or your window will be literally "shattered"—with segments strewn all over the screen!

Sadly, you cannot use *WordPerfect's* Line Draw feature to make box frames for your pop-up windows. You must create them in the macro editor yourself by depressing Alt and typing a number on the numeric keypad, or with *WordPerfect's* compose key.

When using the Alt-key method, press the Alt key and a number on the keypad for each segment of the frame. Use the Backspace and Delete keys to remove unwanted segments. When using the compose key method, press Ctrl-2, type the code for the segment you want to use (don't forget the comma), and press Enter. Repeat the process for each segment of the frame. Use the Backspace and Delete keys to remove unwanted segments.—Gordon McComb; Canoga Park, California

You can experiment with this macro even if your printer doesn't support Helvetica. You'll just get the message "Sorry, can't find the font" at the end. Naturally you're free to modify POP-UP.WPM so it presents fonts available on your system.

POP-UP.WPM uses many advanced macro features, so you can't just enter it in Macro Definition mode. You must carefully construct it within the macro editor. First, start an ordinary macro definition with the name POP-UP. Enter a description, if you like, and immediately end the definition by pressing Ctrl-F10 again. Now define POP-UP once more—this time you'll get a message inviting you to either replace the existing blank macro or edit it. Select #2, Edit, and you're in the macro editor. Again select #2 to get into editing the macro action.

From here on, you'll need to refer care-

Discover PC-Link®



Unlimited online usage for just \$9.95 a month

Finally, an online service for MS-DOS® computer owners has arrived offering a wide variety of exciting and informative services for just \$9.95* a month—no matter how many hours you spend online.

Introducing PC-Link. With PC-Link's friendly, menu-driven DeskMate® interface, you'll discover the services you want—at a great low price that won't have you watching the clock. Services like a Software Buyer's Guide, stock quotes hot off the wires, American Airlines EASY SABRE™ travel services, Grolier's Academic American Encyclopedia™ and news from USA Today*.

Plus, there's more.

As a PC-Link member, you'll also have access to the premium services of PC-Link

Plus at the low rate of 10 cents* a minute. No extra charges for 1200 or 2400 baud users! PC-Link Plus features services designed exclusively for PC owners, including an impressive selection of software for downloading, help from PC experts, clubs, special interest groups, and more.

Your first month is FREE!

This special offer entitles you to 1 free month of unlimited access to PC-Link, plus 2 free hours** of PC-Link Plus services—everything you

need to get you started with your purchase of the PC-Link Software Package for just \$29.95***. That's a \$21.95 value, yours FREE when you become a PC-Link member. What's more, you'll receive a subscription to *PC-Link Update*, your guide to all the exciting events and services online.

Don't delay! Order your PC-Link Software Package today for just \$29.95.

Or visit leading computer and software dealers near you.

Call 1-800-545-6572 Ext.3183

☐ **Yes!** I want to become a PC-Link member! I understand that my introductory PC-Link Software Package includes 1 FREE month of unlimited access to PC-Link, plus 2 FREE hours of evening or weekend use of PC-Link Plus services, and a subscription to PC-Link Update magazine, all for only \$29.95.

Full Name _____	
Street Address _____	
City/State/Zip _____	
Daytime Phone Number _____ Evening Phone Number _____	
Disk Size <input type="checkbox"/> 5 1/4 <input type="checkbox"/> 3 1/2	
Enclosed is my \$29.95 payment. I'm paying by <input type="checkbox"/> MasterCard <input type="checkbox"/> Visa <input type="checkbox"/> Check	
Credit Card # _____	Exp. Date _____
Signature of Cardholder _____	
Mail to: PC-Link 8619 Westwood Center Drive Suite 300 Vienna, VA 22180	
3183	

PC-Link®
The online service for PC owners.

DeskMate®
An interface by Lotus.

*Rates higher during business hours and outside continental United States.
Evening and weekend usage rate of 10 cents per minute applies. *Requires PC-compatible computer with at least 384K RAM, MS-DOS version 2.11 or higher, a Hayes-compatible modem, and a MasterCard, Visa, or checking account for registration. PC-Link is a registered trademark of Quantum Computer Services, Inc. Grolier's Academic American Encyclopedia is a trademark of Grolier's Electronic Publishing, Inc. USA Today is a registered trademark of Gannett Company, Inc. EASY SABRE is a service mark of SABRE Travel Information Network. MS-DOS is a registered trademark of Microsoft Corporation.

©1989 Quantum Computer Services, Inc.

TRACON

Air Traffic Control Simulator

A game? Or a reflection of a deadly reality? It looks simple—just keep every flap on your scope apart as you vector them around for approaches and departures. But they keep coming, pushing you to your limits. And you alone must prevent a dreaded crash between airplanes loaded with passengers.

In the first ever microcomputer simulation of a terminal radar approach and facility created by a PhD ATC simulation expert, an FAA RSO, and two professional controllers, you'll enter the real world of air traffic control.

Handle traffic on a "real" ATC radar scope. Adjust traffic loads from "normal" to "heavy" levels to a five-o'clock rush. Choose "busy" pilots or "stormy" weather to test your skill with pilot errors and "go-arounds."

FAA includes complete 1100-hour written and oral ATC training. It gives you a realistic traffic mix from 1000 Class C to 747 "heavies" in any of 12 center sectors: Los Angeles, San Francisco, Miami, Chicago, and Boston. Yet no experience is necessary. A detailed manual, sample scenarios, and an audio cassette tape take you in ATC procedure and jargon.

A game? Surely, TRACON mirrors a world where lives are at stake, not profits, but lives!

To order, call 1-800-634-9898.

Requires IBM PC or compatible with at least 256K user disk space and graphics monitor. Mouse optional. Price of \$49.95 includes program on 5.25" and 3.5" 5M PC diskettes, 100-page manual, 100-page scenario and an audio cassette tape demonstration scenario. Please add \$5 for shipping and handling. Texas residents add 6% sales tax. We ship the next day via UPS. Unconditional 30-day money-back guarantee. If not completely satisfied, just return it to us for a full refund. Dealer requires advance.

Wesson
INDUSTRIES

1400 Circle Rider Dr.
Austin, Texas 78746
(512) 259-0400

Producing innovative, elegant
microcomputer software since 1981

ESA Screen Photograph of TRACON



CIRCLE 203 ON READER SERVICE CARD

MOVING?

Please write to: PC Magazine, P.O. Box 54093, Boulder, CO 80322. Include your mailing label from a recent issue of PC Magazine for faster service. Please allow up to 60 days for change of address to take place.

■ POWER USER

fully to Figure 1. There are several kinds of elements in the macro. Special commands, variables, and command keys appear in curly braces { }. Everything else is ordinary text.

■ To insert a special command, hit Ctrl-PgUp and select it from the menu.

■ To insert a command key, press Ctrl-V followed by the key.

■ To insert a variable, press Ctrl-V and Alt-n, where n is the number of the variable.

■ To insert ordinary text, just type it in.

Within the ordinary text, this macro uses six line-drawing characters to create boxes. It's easiest to enter these using the Alt-key method. The character numbers are: horizontal line, 205; vertical line, 186; upper-left corner, 201; upper-right corner, 187; lower-left corner, 200; lower-right corner, 188.

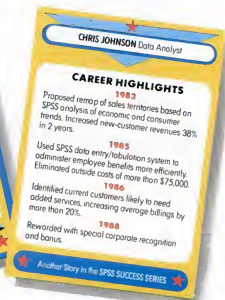
As you type, you'll notice that space characters in your macro are represented by a midline dot character. Press the Enter key at the end of lines, as usual. What is shown as {Enter} is a command key, so you'd press the three-key combination Ctrl-V-Enter to insert it. Don't try to type in the special commands using the { } and } keys!

Creating this macro will take some effort, but you'll learn quite a bit about the advanced macro features of *WordPerfect 5.0* in the process. When you've studied this one, add pop-up windows to your own macros. Anywhere you're prompting the user for information, you can expand the prompt into a helpful window.—Neil J. Rubenking

Share Your Power

Tell fellow users your latest technical tips for hardware and software applications (other than spreadsheets, networks, languages, or DOS) through Power User. We'll pay \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on-disk. If you do, please include a printout. Mail contributions to Power User, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to the PC MagNet (to join, see the "By Modem" sidebar in the Productivity section).

We'll take your stats and make you the most valuable player in your league.



Data analysis software from SPSS® gives your PC a winning advantage.

It doesn't matter which field you play hardball in. The right combination of equipment and ability can make you a hero.

You get that ability with SPSS/PC+™, the best-selling data analysis software from SPSS. It's designed for the IBM PC/XT, PC/AT, PS/2™ and compatibles. And with it, you'll turn raw data into real facts, for sound business decisions.

SPSS/PC+ features a base package of numerous statistical procedures. Plus some

powerful options for data entry, advanced statistics, forecasting, graphics, mapping and much more. So you can scrutinize and manipulate your data in countless ways.

SPSS/PC+ also provides a seamless interface with other popular PC software such as dBase™ and 1-2-3™, to give you complete command of your data. For market research, sales analysis, quality control and much more.

Yet, SPSS/PC+ is designed for ease-of-use. It features a menuing and help system, as well as an on-line statistical glossary that helps you interpret results as you go.

And you'll always have training, support,

and ongoing upgrades from SPSS. The team that's supplied statistical software to over 1 million users since 1968.

For more details on how SPSS/PC+ can help you get the most out of your micro, give us a call at

1-312-329-3316.

We'll show you how to really stand out in your field.

SPSS inc.

Best in the final analysis.

444 North Michigan Avenue • Chicago, Illinois 60611

SPSS is a registered trademark of SPSS Inc. SPSS/PC+ is a trademark of SPSS Inc. IBM PC/XT, PC/AT and PS/2 are trademarks of International Business Machines Corporation. dBase is a trademark of Ashton-Tate. 1-2-3 is a trademark of Lotus Development Corporation.

To learn Microsoft QuickBASIC, you only need a manual this thick.



You're looking at something you won't see anywhere else.

It's called QB Advisor. A remarkable new hypertext electronic manual that can make you instantly more productive, even if you don't know the first thing about programming. QB Advisor actually lets you experiment by cutting and pasting useful sample programs right into your programming window. Only Microsoft has it. Only Microsoft could. And it's just one of the things you'll learn about new Microsoft® QuickBASIC version 4.5 for IBM® PCs and compatibles.

Another is the step-by-step tutorial that actually takes you through every stage of programming by working you through a complete program.

And QB Express—the interactive way to learn all about your programming environment in a matter of minutes—not hours.

Microsoft QuickBASIC also comes with Easy Menus that let you develop programs with

a minimum number of menu choices. Context-sensitive Help for immediate help with error messages and variables by simply punching a key, or clicking a mouse. And a built-in debugger that lets you see exactly what your program is doing, as it's doing it.

Best of all, Microsoft QuickBASIC is packed with enough power to handle whatever problems drove you to programming in the first place. Fact is, it translates your program into executable code at an incredible 150,000 lines per minute.

Microsoft QuickBASIC version 4.5. If programming is the only way out, this is the easiest way in.



Microsoft
Making it all make sense.

■ EDITED BY ROBERT L. HUMMEL

LANGUAGES



A quicker way to search text in BASIC; Turbo Pascal routines for creating your own editor; an automatic word-align function in Turbo Pascal 5.0.

Writing your own editor? These Turbo Pascal routines may get you started

When handling text files in Turbo Pascal, it is convenient to read the file into an array of strings. While this may be fine for some applications, the array size is limited by the 64K data segment that must be shared with other variables. Another way to buffer text

is to allocate memory dynamically from the heap using GetMem.

My sample program LINKTEXT.PAS, shown in Figure 1, demonstrates how to read a text file into a singly linked list. Each element in the list contains a string and a pointer to the next element. The "Head" record is actually a dummy element, which contains only a pointer field that always points to the first real element in the list. Notice that we must allo-

cate 5 bytes more than the length of the string. This allows for the length byte of the string and the 4 bytes required for the pointer field.

The procedure DisplayFile traverses the list from top to bottom and writes each line of the list. The DeleteLine and InsertLine procedures show how to insert and delete records from this type of list by changing pointers.—*Michael A. Reeder; Beaumont, Texas*

```

PROGRAM LinkText;
USES CRT; { Omit this line for version 3 }
TYPE
  AnyStr = STRING(255);
  LinePtr = ^LineRecType;
  LineRecType = RECORD
    NextLine : LinePtr;
    LineField : AnyStr;
  END;
  VAR
    TextFile : Text; { Input File }
    Head : LinePtr; { Head of List }
    Nold : LinePtr; { Place holder }
    Cur : LinePtr; { Current line }
    FileName : AnyStr; { File Name }
    OK : Boolean; { I/O Error Flag }
    LineNo : Integer; { Input Buffer }
    L : Integer; { Line Number }

    PROCEDURE LoadFile;
    { LoadFile prompts for a file name and
      loads the file into a linked list }
    BEGIN
      CLRECR;
      Write('Enter File Name: ');
      ReadLn(FileName);
      Assign(TextFile, FileName);
      ($I-) Reset(TextFile); ($I+)
      OR := (IOResult = 0);
      IF OR THEN
        BEGIN
          GOTO(Head, 4);
          Head.NextLine := NIL; { Initialize Head }
          Nold := Head;
          WHILE NOT Eof(TextFile) DO
            BEGIN
              ReadLn(TextFile, LineNo);
              GetMem(Cur, Length(LineNo)+5); { Allocate memory }
              Cur.NextLine := Nold; { Set previous pointer }
              Cur.LineField := LineNo; { Cur goes at end of list }
              Nold := Cur; { Save current pointer }
            END;
          Close(TextFile);
        END;
      END; { of LoadFile }

    PROCEDURE DisplayFile;
    { DisplayFile traverses the list and writes each line }
    BEGIN
      CLRECR;
      Cur := Head.NextLine;
      WHILE Cur <> NIL DO
        BEGIN
          WriteLn(Cur.LineField);
          Cur := Cur.NextLine;
        END;
      END; { of DisplayFile }

    PROCEDURE DeleteLine(N : Integer);
    { DeleteLine deletes the Nth line of the buffer. }
    VAR
      Count : Integer;
    BEGIN
      Nold := Head;
      Cur := Head.NextLine;
      Count := 1;
      WHILE (Count < N) AND (Cur <> NIL) DO
        BEGIN
          Nold := Cur; { Save current pointer }
          Cur := Cur.NextLine; { Advance to next line }
          Count := Succ(Count); { Increment counter }
        END;
      IF (Cur <> NIL) AND (Count = N) THEN
        BEGIN
          Nold.NextLine := Cur.NextLine; { skip current line }
          FreeMem(Cur, Length(Cur.LineField)+5);
        END;
      END; { of DeleteLine }

    PROCEDURE InsertLine(N : Integer; NewStr : AnyStr);
    { InsertLine inserts the line NewStr before line N. }
    VAR
      Count : Integer;
      NewLine : LinePtr;
    BEGIN
      Nold := Head;
      Cur := Head.NextLine;
      Count := 1;
      WHILE (Count < N) AND (Cur <> NIL) DO
        BEGIN
          Nold := Cur; { Save current pointer }
          Cur := Cur.NextLine; { Advance to next line }
          Count := Succ(Count); { Increment counter }
        END;
      END; { of InsertLine }
  
```

(continues)

Figure 1: The LINKTEXT.PAS program provides the basics for writing a simple editor.



© 1988 Hayes Microcomputer Products, Inc.

ERROR-CONTROL FOR FORCES BEYOND YOUR CONTROL.

The hazards faced by your high-speed data can be truly shocking.

That's why, in addition to providing the original V-series™ error-control, Hayes V-series 2400 and 9600 bps modems now offer error-control in either international standard V42 or X.25.*

The V42 protocol, for point-to-point communications, automatically detects errors and then retransmits the data correctly. While the X.25 protocol not only offers error-control but also multisession access to value added networks with expanding applications for dial-up X.25 point-to-multipoint communications.

V-series modems still provide users with data compression that can double throughput. And Hayes AutoSync for built-in synchronous communications without the added expense of a synchronous adapter card.

All to give you more control. Because with a Hayes, the only error you can make is not buying one.



For your nearest Hayes Advanced Systems Dealer, call 800-695-1225. Hayes Microcomputer Products, Inc., PO Box 105203, Atlanta, GA 30348.

*There will be a minimal charge of \$50 for either an X.25 or V42 upgrade on products purchased before October 1, 1988. Products purchased on or after October 1, 1988 will include either standard as they become available. For details call Hayes Customer Service: 404-441-1617.

Hayes.

NEW BLAISE TOOLS

The fastest way to create powerful programs with Turbo Pascal 5.0 and Turbo C 2.0!

Blaise Computing, manufacturer of function libraries that offer easy-to-use solutions to your programming needs, introduces:

POWER TOOLS PLUS/5.0—\$149

—completely integrated and lightning-fast routines to help you:

- ◆ Add moving bar pull-down menus and windows to your user interfaces; NEW! ◆ Generate context sensitive help screens; NEW! ◆ Add easy-to-use date and time conversion routines; NEW! ◆ Let users choose from window oriented pick lists; NEW! ◆ Create and access "btree" data structures; NEW! ◆ Use multiple-line edit fields with fully configurable edit keys; NEW! ◆ Speed up your sorting with flexible in-memory sort routines; NEW! ◆ Add EMS support; NEW! ◆ Write TSIs and ISRs easily; ◆ Control DOS memory allocation; ◆ Create powerful programs in Turbo Pascal 4.0 & 5.0!

Turbo C TOOLS/2.0—\$149

—tight, fast, high quality functions to help you:

- ◆ Add easy-to-use mouse support for windows and menus; NEW! ◆ Quickly include virtual windows and menus; NEW! ◆ Integrate your windows and menus with Turbo C's text windows; NEW! ◆ Create context sensitive help screens; NEW! ◆ Provide multiple line edit fields with fully configurable edit keys; NEW! ◆ Use keyboard and video services (including enhanced keyboard and VGA); NEW! ◆ Write TSIs and ISRs easily; ◆ Create powerful programs in Turbo C 1.0, 1.5 and 2.0!

FREE with these products!

Source code, complete sample programs, a comprehensive reference manual with extensive examples, the Norton Guides Instant Access Program, and an online database. We also offer free technical support and a bulletin board system dedicated to technical issues.

Unleash your programming potential!

Blaise Computing offers programming tools that are fast, flexible and affordable. Call now to order or to ask for a free brochure on our full line of products for C and Pascal.

Put Blaise tools to the test!

If at any time during the first 30 days you are not completely satisfied with their speed and flexibility, we'll refund your money.

Call 800-333-8087 today!

BLAISE COMPUTING INC.

2560 Ninth St., Suite 308, Berkeley, CA 94710, (415) 540-5441
FAX: 415-540-1808

Turbo C and Turbo Pascal are trademarks of Borland International.

■ LANGUAGES

Turbo Pascal 5.0 word-aligns some variables—even if you tell it not to

Turbo Pascal 5.0 has the ability to word-align (store at an even offset in memory) all variables larger than 1 byte. This can result in increased speed on 80286 computers. The {SA±} compiler directive globally controls whether word alignment is on or it is off.

If a program makes assumptions about the relative addresses of variables, word alignment can throw it off. For example, programs that configure themselves by modifying typed constants within the EXE file usually assume those constants will be contiguous in memory. When your programs require that variables be contiguous, use {SA-} to turn off word alignment.—Jason Destin, Miami Beach, Florida

The directive {SA-} doesn't completely eliminate word alignment. The first variable in any VAR declaration is aligned on a word boundary, even when you've set {SA-} and regardless of the variable's size. This can conceivably be a problem, because Turbo Pascal allows multiple VAR declarations. The program in Figure 2 demonstrates this effect. The first group of variables, X1, Y1, and Z1, are all in the

same VAR declaration. Because word alignment is off, Y1 resides in memory immediately after X1. Variable Z1 is a word that overlaps both X1 and Y1, so making an assignment to Z1 affects both of the other two.

The second group differs only in that there is another VAR line between the X2 and Y2 variables. This makes a big difference, though. Variable Y2 is now also word-aligned, so it does NOT follow immediately after X2. An assignment to Z2 does NOT affect Y2. The WriteLn statements demonstrate this fact. To make things very clear, I fill the whole data area with \$FF before the assignments.

Note that the demo program in Figure 2 is using byte variables. According to the manual, even with {SA+}, Turbo Pascal 5 doesn't word-align variables unless they're larger than 1 byte. So this oddity could surprise you even with word alignment ON.—Neil J. Rubenking

Make your text searches faster in BASIC without using assembly language

Microsoft's QuickBASIC compares integers more quickly than strings. Thus it is possible to speed up searching through string data by doing a hybrid search in

```
PROGRAM Alignment_demo;
{$A-}
VAR
  X1 : Byte; Y1 : Byte;
  Z1 : Word ABSOLUTE X1;
VAR
  X2 : Byte;
VAR
  Y2 : Byte;
  Z2 : Word ABSOLUTE X2;
  dummy : byte;
BEGIN
  FillChar(X2, Ofc(dummy) - Ofc(X1), $FF);
  Z1 := $8181;
  Z2 := $0202;
  WriteLn('X1=', X1, ' Y1=', Y1);
  WriteLn('X2=', X2, ' Y2=', Y2, ' (Y2 should equal 2)');
  WriteLn('Note that the offsets below are all EVEN.');
```

```
  WriteLn('Offset of X1=', Ofc(X1));
  WriteLn('Offset of X2=', Ofc(X2));
  WriteLn('Offset of Y2=', Ofc(Y2));
END.
```

Figure 2: Turbo Pascal 5.0 always word-aligns the first variable of a VAR block.

"If (a computer system) won't accept a Northgate keyboard, I won't buy it."

—Burton L. Alperson

Seybold's Outlook on Professional Computing

NO RISK!

TRY IT FOR 10 DAYS

Return for refund if

not 100% pleased.

(your only risk is

cost of shipping)



In just six months, OmniKey/102 has become the world's leading replacement keyboard.

WHY WE PUT THE F KEYS ON THE LEFT. Most people learned keyboard typing on boards with the F keys at the left. That's where they're most convenient and easiest for the left hand to use them. Both hands stay in place as typing school teaches. Speed and accuracy increase and production soars.

OmniKey/102
Now compatible with Compaq!

OmniKey/102

FOR PC, XT, AT, 386 TYPE-SYSTEMS, IBM, AT&T, COMPATIBLES—Northgate designed OmniKey/102 in response to countless users who demand better layout, better touch and positive entry feel!

Northgate's OmniKey/102 is the standard by which all others are judged. Read why...

"The feel of the OmniKey/102 is as close as you're going to get to the IBM standard without having the real thing."

—Donald F. Willmetts, PC Computing

"...on a subjective 1-10 point scale of mush to well-defined feedback, I would rate the Compaq keyboard as a 1, an IBM keyboard as an 8, and a Northgate 102 keyboard as a 10."

—Burton L. Alperson,
Andrew Seybold's Outlook on Professional Computing

"...12 function keys on the left where God intended them...revolutionary and much needed...Better than any replacement keyboard...duplicates the responsiveness and tactile feedback of the original IBM keyboard...A viable alternative to IBM's own model...durable, well-designed, sensible and has just the right feel..."

—Gary Ray, PC Week

Features you'll find only in the OmniKey/102

- Exclusive Northgate Click/Tactile touch using Japanese made ALPS sealed electro-mechanical key switches rated for virtually a lifetime of use.
- Three-Year UNCONDITIONAL WARRANTY. Anything breaks, we fix or replace free.
- LED light panel for CapsLock, NumLock and Scroll Lock (IBM doesn't have lights).
- ESC, CTRL, SHIFT, ALT keys are color coded Red, Green, Blue for WordPerfect® users. Vertical templates fit, too!
- Enter Key is jumbo sized, L-shaped. Backspace key is double-width. Both Shift keys are oversized for error-free operation.
- ESC key is where it belongs, next to No. 1 on the top numeric row.
- CTRL key is where you expect to find it, too, next to letter A.
- CapsLock key is next to space bar.
- 9 Cursor and screen control keys

- on separate pad.
- Full Numeric Keypad AND WE'VE EVEN ADDED AN (=) KEY FOR FULL REDUNDANCY WITH TOP NUMERIC ROW. Spread sheet users and accountants love this feature.
- Built to last with full metal base (most keyboards are all plastic). OmniKey/102 has a solid 5.5 lb. "sit down on your desk to study feel."
- Pop-up back legs adjust typing angle for maximum comfort.

ORDER YOURS TODAY. Hurry. Supplies may be limited!

NORTHGATE COMPUTER SYSTEMS, INC.
13895 Industrial Park Blvd., Suite 110
Plymouth, Minnesota 55441

Yes. Ship my OmniKey/102 order(s).
I understand I may use it for 10 days and if I wish, may return it for full product cost refund. I agree to pay for freight both ways.

Compatibility Notes:

Requires standard 5-pin circular connector as on most IBM standard computers and compatibles.

Northgate will accept COD and purchase orders from credit-worthy buyers for quantities totaling \$500.00 or greater. For quantity prices phone our corporate headquarters 612-553-0734.

FAX orders to 612-553-1865.

* SHIPPING: Allow 5 days for order processing before shipment. Thereafter, shipments can be:

- 1) UPS Ground add \$7.00 ea.; allow 2-3 weeks for delivery.
- 2) UPS Second Day add \$12.00 ea.;
- 3) UPS Overnight add \$22.00 ea.

OmniKey/102 and Northgate are trademarks of Northgate Computer Systems. All other products are trademarks and/or registered trademarks of their manufacturers. Copyright 1988 Northgate Computer Systems, 13895 Industrial Park Blvd. Suite 110, Plymouth, MN 55441.



1-800-526-2446

HOURS: MON-FRI 9 A.M.-7 P.M., SAT 9 A.M.-2 P.M. CST

Name _____

Company _____

Ship to (Address) _____

City _____ State _____ Zip _____

Phone _____

Computer Brand & Type _____

QTY.	ITEM	SHIPPING	TOTAL
	OmniKey/102	\$ 99.00	\$
	C/T 101	\$ 99.00	\$
	C/T 84	\$ 79.00	\$
	AT&T 6300	\$124.00	\$
	PS/2 Models (add for ea.)	\$ 25.00	\$
* TOTAL OF ORDER			\$

Prepaid amount enclosed \$ _____

Please charge to my ☐ Visa ☐ MasterCard Account

Card No. _____ Expires _____

Signature of Cardholder _____

(My signature authorizes a charge to my account for the above merchandise prior to shipping to initiate processing of my order)



Virtual Memory for DOS!

MicroWay is your best source for the software and hardware you need to get true 32 bit performance from your 386. These include 32-bit tools, such as NDP Fortran and C, and the 32-bit applications that were developed with them (see last paragraph). These products run in protected mode under Unix, Xenix, or Phiar Lap extended MS-DOS.

Starting with release 1.4VM, NDP Fortran and C not only access 4 gigabytes of memory, but run with Phiar Lap's new VMM extension which provides 386 protected mode virtual memory. Now you can run a program with a 30 MB array on a 2 MB system simply by having 30 MB of free space on your hard disk.

MicroWay also offers transputer based parallel processing boards and languages that run in an XT, AT, or 386. Each of the T800 RISC processors on these boards packs the power

Dr. Robert Atwell, leading defense scientist, calculates that NDP Fortran-386 is saving him \$12,000 per month in rentals of VAX hardware and software while doubling his productivity!

Fred Ziegler of AspenTech in Cambridge, Mass. reports, "I ported 900,000 lines of Fortran system in two weeks without a single problem!" AspenTech's Chemical Modeling System is in use on mainframes worldwide and is probably the largest application to ever run on an Intel processor.

Dr. Jerry Ginsberg of Georgia Tech reports, "My problems run a factor of six faster using NDP Fortran-386 on an mW1167 equipped 386/20 than they do on my MicroVAX II."

of a 20 MHz 386/1167. Our best selling board, the Quadputer²™, has four T800s and boasts 40 MIPS/6 megaflops of processor throughput.

MicroWay manufactures Weitek 1167 and 3167 coprocessor cards that run with the 80386. Both cards include an 80387 socket. The 1167 is 2 to 4 times faster than the 80387. The 3167 runs 30% faster than the 1167 in double precision. The key to achieving this speed increase is our NDP Fortran or C and the new 32-bit application that offer Weitek support. Either processor provides a dramatic increase in throughput for graphics intensive applications. These include VersaCad and Hoops 3D graphics, ANVIL 5000 CAD/CAM, SRAC and Swanson Analysis finite element packages, Mathematica and a host of other packages that were recently ported to the 386 using our NDP Fortran and NDP C. Please call (508) 746-7341 for more information.

32-Bit Compilers and Tools

NDP Fortran-386™ and NDP C-386™ Compilers generate globally optimized, mainframe quality code. Both run in 386 protected mode under Unix, Xenix or Phiar Lap extended MS-DOS. The memory model employed uses 2 segments, each of which can be up to 4 gigabytes. They generate code for the 80287, 80387, mW3167 or mW1167. Both include high speed EGA graphics extensions written in C that perform BASIC-like screen operations.

- NDP Fortran-386™ Full Implementation of FORTRAN-77 with Berkeley 4.2 and Fortran-66 extensions. \$595
- NDP Fortran-386/VM \$695
- NDP Fortran-386/UNIX \$795
- NDP C-386™ Full Implementation of AT&T's PCC with MS and ANSI extensions. \$595
- NDP C-386/VM \$695
- NDP C-386/UNIX \$795

Phiar Lap 386/VMM extensions are supported by the VM releases of NDP Fortran and C. Virtual memory is used automatically by the compilers and the code they generate. This makes it possible to compile and run programs as large as the free space on your hard disk. Phiar Lap Virtual Memory Manager ... \$295
Phiar Lap Development Tools \$495

NDP Windows™ — NDP Windows includes 80 functions that let you create, store, and recall menus and windows. It works with NDP C-386 and drives all the popular graphics adapters. Library: \$125, C Source: \$250

NDP Plot™ — Calcomp compatible plot package that is callable from NDP Fortran. It includes drivers for popular plotters and printers. Works with CGA, MDA, EGA and VGA. \$325

NDP/FFT™ — Includes 40 fast running, hand coded algorithms for single and double dimensional FFTs which take advantage of the 32-bit addressing of the 386 or your hard disk. Callable from NDP Fortran with mW1167 and 80387 support. \$250
367FFT for 16-bit compilers \$250

NDP to HALO '88 Graphics Interface — This module enables you to call graphics routines in HALO 88 from NDP Fortran or C. \$100

MicroWay® 80386 Support (508) 746-7341

Parallel Processing

Videoputer™

The highest performance graphics card on the market. Uses a T800 and T134010 in conjunction with a 130 MHz BrookTree DAC. The board comes with one meg of system RAM, one meg of video RAM and a library of graphics primitives. It runs standalone or in conjunction with a transputer network and drives 32 and 64 KHz analog monitors. \$4995

Monoputer2™

The world's most popular PC transputer development product now extends the memory available for developing transputer applications from 2 to 16 megabytes. The board features a DMA bus interface for fast I/O.
Monoputer2 with T414 (0 MB) \$995
Monoputer2 with T800 (0 MB) \$1495

Quadputer2™

This board for the AT or 386 can be purchased with 2, 3 or 4 transputers and 1 or 4 megabytes of memory per transputer. Two or more Quadputers can be linked together to build networks of up to 100 or more transputers providing mainframe power. from \$3495

Transputer Compilers and Applications
These Parallel languages are designed for use with Monoputer2 and Quadputer2.

- Logical Systems Parallel C \$595
- 3L Parallel C or 3L Parallel Fortran \$895
- Microfield - Finite element analysis \$1600
- ParaSoft: Parallel Environment \$500
- Performance Monitor \$500
- C Source Level Debugger \$500
- T800/NAG™ (See NDP/NAG) \$2750

367BASIC™ — Our 16-bit MS compatible compiler introduces numeric register variables to produce the fastest running 80x87 code on the market. \$249

Weitek-Based Coprocessor Boards

mW1167™ and mW3167™ coprocessor boards are built at MicroWay using Weitek components. Each includes an 80387 socket.
mW1167-18 \$895
mW1167-20 \$1095
mW1167 Microchannel-16/20 CALL
3167-20 \$995
3167-25 \$1295
mW3167/80387 Board \$150

Intel Coprocessors and RAM

8087	.....	\$84
8087-2	.....	\$120
8087-8	.....	\$105
80287-10	.....	\$220
80C287A (CMOS)	.....	\$280
80387-16	.....	\$350
80387-18SX	.....	\$310
80387-20	.....	\$400
80387-25	.....	\$500
287Turk12 (for AT compatibles)	.....	\$350
RAMpak™ 1-meg 32-bit memory module for Compaq system memory board	.....	\$650
256K 100ns DRAM	.....	CALL
256K SIMMS	.....	CALL
1 MB SIMMS	.....	CALL

(All of our Intel coprocessors include 87Teet.)

Multi-User Accelerators

MicroWay's AT8™ and AT16™ intelligent serial controllers run 8 to 16 terminals under Unix or Xenix without bogging down your AT. 80386 or PS/2 PC. AT8: \$995 AT16: \$1295

32-Bit Applications

PSTAT-386 — Popular mainframe statistics package. Full version was ported. \$1495
NDP/NAG™ — Features a library of 268 engineering and scientific numerical algorithms. Callable from NDP Fortran \$895
Call for our list of new 32-bit applications.

12 MHz PC Accelerators

FastCACHE-286 12 MHz	.....	\$299
SuperCACHE-286 12 MHz	.....	\$309
FastCACHE-286 9 MHz	.....	\$199

MicroWay

World Leader in PC Numerics

Corporate Headquarters: P.O. Box 79, Kingston, MA 02364 USA (508) 746-7341
32 High St. Kingston-Upon-Thames, U.K. 01-541-5466
USA FAX 508-746-4678 Australia 02-439-8400 Germany 069-75-1428

■ LANGUAGES

```

DEFINT A-Z
FOR i = 1 TO n
  IF search$ = array$(i) THEN
    PRINT search$: " found at element": i
  EXIT FOR
NEXT i
NEXT

```

Figure 3: The conventional way to search a string array in BASIC, while effective, is slow.

```

DEFINT A-Z
a = ASC(search$)
FOR i = 1 TO n
  IF a = ASC(array$(i)) THEN
    IF search$ = array$(i) THEN
      PRINT search$: " found at element": i
    EXIT FOR
  END IF
NEXT i
NEXT

```

Figure 4: An improved search method tests with ASC() to speed up string searches.

which the ASCII value of the string is used first as a precursor to a full comparison. The standard way that you search through a string array is by comparing each element directly, as in the program fragment STRING1.BAS, shown in Figure 3 above.

A much better approach is given in STRING2.BAS (Figure 4), which can perform as much as 60 percent faster as STRING1.BAS. The improvement will not be noticed unless the program is compiled to an .EXE file.—Norman Swartz; Burnaby, British Columbia, Canada

String operations are one of the slowest things that QuickBASIC does, and checking the ASCII value of each element does indeed quickly weed out those strings that couldn't possibly match. Be aware that both of the methods shown are case-sensitive, which means that searching for Smith will not find SMITH or smith.—Ethán Winer

Speak Your Language

Share your knowledge of BASIC, C, Pascal, FORTRAN, and COBOL with Languages readers. We'll pay you \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on-disk. Please include a printed copy. Mail contributions to Languages, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity Section).

HARD DRIVES

INTERNATIONAL

MiniScribe
Solutions for Data Storage



Card Drive™

Card Drive 20-8225 68ms	\$279
Card Drive 30-8438 68ms	\$309
Card Drive 40-8450 46ms	\$359

These Card Drives use quality MiniScribe drives.

Features--

- Available for PC/XT and most Tandy models.
- Quality engineered for reliability.
- Auto lock feature.
- ONE YEAR Warranty.
- Super easy installation and setup.
- Pre-formatted, Pre-tested and **READY TO GO!**

Seagate

PC/XT KITS

20Mb ST225	half ht.	65ms	\$244
30Mb M8438	half ht.	65ms	\$279
40Mb M8450XT	half ht.	46ms	\$319
62Mb M3675	half ht.	61ms	\$379
80Mb ST251/PS180	half ht.	40ms	\$499
130Mb M6085/PS180	full ht.	28ms	\$699

ALL KITS COME COMPLETE . . .
with drive, controller, cables, How-To Manual and mounting hardware. 40Mb and larger drives also include partitioning software.

AT/386 DRIVES

ALL DRIVES include AT mounting hardware and "Disk Manager" formatting/partitioning software!!

40Mb Seagate	ST251-1	half height	28ms	\$399
71Mb MiniScribe	M6085	full height	28ms	\$539

High Capacity Drives

160Mb MiniScribe	M3180E	half height	16ms	\$1375
340Mb MiniScribe	M9380E	full height	16ms	\$2195

High Capacity drives include an ESDI "1 to 1" high performance

Hard/Floppy Controller!

ONE YEAR Warranty on all products!

HARD DRIVES
International
An IBM Company

1912 W. Fourth St. Tempe, AZ 85281

(602) 947-7435

TELEX: 405765 FAX: (602) 939-9190

South American Distributor: Hardware Express

Avenida Luis Telleria Ojeda 6135-10

Phone (502-2311144 FAX (502-2335666

Santiago-Chile

Call Toll Free **1-800-234-DISK**

International Orders: (602) 784-1038

Order Status: 1-800-234-5197



Never a Surcharge
for Visa or MasterCard



Prices and availability subject to change without notice. All items are sold "As Is" with no warranty for performance. All items are sold "As Is" with no warranty for performance. All items are sold "As Is" with no warranty for performance.

PC00489

SAME DAY SHIPMENT. GUARANTEED*

Yes, we can ship your system today! We've built an extra supply of our most popular selling Complete 12 MHz, Zero Wait State, 32MB Hard Drive systems.

These are complete, genuine ZEOS 12/0 Systems. They include a high speed 32 MB Seagate hard drive and all the other goodies. And they're ready to ship. *Right Now!*

Here's how it works. We have these extra systems pre-built and ready to ship. They include both High Resolution Monochrome and EGA systems. While supplies last, we will ship either of these systems to you *the day you order* subject to these conditions:

1. Your order must be received by 1PM Central Time.
2. Credit Card orders are subject to credit card authorization.
3. Orders must be for our standard 12MHz Monochrome or EGA systems. Other systems or upgrades are custom built and will take slightly longer.



COMPUTERS NOW! BY ZEOSSM

**COMPLETE 12MHz, ZERO WAIT
286 SYSTEM WITH 32MB
HARD DRIVE!**

**Complete Monochrome
32 MB Hard Drive System
ONLY \$1,395**

**Complete EGA Color
32 MB Hard Drive System
ONLY \$1,890**

***OUR GUARANTEE TO YOU:**

If we fail to ship your system under the conditions outlined we will ship it *at our expense* as soon as it is ready. All systems are fully burned in and tested. Each system includes our 30 day Money Back Guarantee and One Full Year Limited Warranty.

This offer is good only as long as these pre-built systems remain in stock; please give us a call to verify availability. This offer does not apply to other ZEOS systems or custom configurations.

FREE SHAREWARE DISKS TOO! 25 Software Programs Included.

Every system will include 25 ready to run Shareware programs on 5 *free* disks. Included are programs for Word Processing, Spread Sheets, Educational, Financial, Business, Games and more. With Shareware you can try the programs first before you register them with the author. What a great idea!

STANDARD FEATURES INCLUDE:

- High Res 12" Amber Display with Tilt and Swivel Base. Compatible graphics controller. EGA optional.
- 80286-12 CPU, 6/12MHz Dual Speed, Keyboard/Hardware Selectable.
- Zero-Wait State DRAM, 512K expandable to 4MB on the motherboard (16MB System Total).
- Fast 32MB Seagate 138R Hard Drive with auto-park, 1.2MB Floppy Drive.
- Ultra high speed Hard/Floppy controller. 1:1 interleave, 800 KB/sec transfer rate.
- ZEOS/RS 101 Enhanced Keyboard, Pleasant Tactile/Click Feel.

- Serial and Parallel Printer Ports.
- Clock/Calendar with Battery Backup.
- 6-16 and 2-8 bit expansion slots. 80287 support.
- Space Saver Case with Security Lock, LED indicators.
- 30 Day Money Back Guarantee. Full One Year Limited Warranty.
- Many other options available. Call for details.

**ORDER NOW TOLL FREE
800-423-5891**

FAX Orders Dial: 612-633-2310
In Minnesota Call: 612-633-4591
MasterCard, VISA and CO-OP
Open days, evenings and weekends.



Prices do not include freight, are subject to change without notice and may be subject to a memory surcharge. CO-OP orders may require an advance deposit. Call for current prices and warranty details. ZEOS is a publicly traded company: MFIS St. Paul Local (OTC: ZEOS International, Ltd., 530 5th Avenue, N.W., St. Paul, MN 55102 © 1989

CIRCLE 723 ON READER SERVICE CARD

■ ROBERT L. HUMMEL

PC TUTOR



Preventing batch files from ending prematurely; examining large files with DEBUG; interpreting PCMAP's output; producing the ESC character you need for ANSI commands.

The output of the PCMAP program can be confusing

When the BASIC program for PCMAP appeared in the August 1987 PC Lab Notes column, I keyed it in and created it. I have used the program to find what is in memory a number of times. But recently, I tried to use it to find why *Quattro* said I had only 107K of memory free. It was then I found that PCMAP gives ludicrous results.

Figure 1 shows a printout of the PCMAP results. PCMAP gives CA and C8 as the length of COMMAND.COM and 1DEE as the length of PCMAP!

In all honesty, I am not writing to complain but to inquire whether you have a revised version of PCMAP. It's possible that I may have overlooked a printed correction.—R. Clark Jones; Cambridge, Massachusetts

As strange as the results may seem, there's nothing wrong with PCMAP. Because it's such a small utility and there isn't a lot of code spent on making the display pretty or easy to read, it may take some explanation to make sense of the numbers.

First, all the numbers listed are in hexadecimal and may have to be converted to decimal to make sense. The first column, "Segment," is the segment of the program that owns the memory. This is also called the Process Identifier (PID).

The second column, "Paragraphs," gives the total number of paragraphs of memory allocated to this PID. A paragraph is 10h (16) bytes, and this number

includes the program block, environment block, and any other memory the program may have allocated.

The third column gives the name of the program if available. The name is maintained only by DOS 3.0 and later and can be obtained—unless the program releases its environment block when it's loaded, as some memory-resident programs do.

The first entry in Figure 1 lists the size of COMMAND.COM as CAh paragraphs. This is 3,232 bytes, and it represents the size of the resident portion that COMMAND.COM leaves in memory when running another program. DISK-LITE.COM is a memory-resident program. Another program (unknown) is also memory resident.

The program TURBO.EXE is in memory, and it occupies 32F2h paragraphs, or 208,672 bytes. From this program, you invoked a second copy of COMMAND.COM, which was loaded into memory. You then executed PCMAP. This caused

COMMAND.COM to release all but C8h paragraphs of itself (3,200 bytes) and run PCMAP.COM. Because .COM programs are allocated all memory when they start, PCMAP is shown as owning 1DEEh paragraphs (122,592 bytes).

A bug in the IBM PC-XT BIOS causes some video routines to return incorrect values

I'm having trouble understanding the ROM BIOS video function 3, Read Cursor Position. When I boot my IBM PC-XT with a monochrome display, the cursor is obviously at scan lines 11–12. But the Read Cursor function tells me the cursor is sitting at scan lines 6–7. On returning to DOS after executing BASIC, the function properly reports scan lines 11–12. But returning to DOS after running my editor has Read Cursor reporting lines 6–7 again.

What's causing the Read Cursor func-

PCMAP 1.0 (c) 1987, Ziff-Davis Publishing Corp.

Segment	Paragraphs	Program
4C22	00CA	COMMAND.COM
4CEE	0003	(Free)
4CF8	0019	DISK-LITE.COM
4D0D	0005	(Free)
4D13	013F	(Unknown)
4E5C	32F2	TURBO.EXE
8150	00C8	COMMAND.COM
821A	1DEE	PCMAP.COM

Figure 1: The output from the PCMAP program displays the programs in memory and the amount of memory they are allocated. As strange as they seem, these results are correct.

■ PC TUTOR

tion to get its data from something other than the actual cursor? None of this happens on my IBM PC-XT/286.—*Barry Gordon; New York, New York*

The IBM BIOS in your model of IBM PC-XT has a bug that causes it to perform exactly as you describe. The BIOS sets the cursor registers that control the cursor shape correctly for the Monochrome Display Adapter (MDA), but it sets the BIOS data area in low memory to reflect a Color Graphics Adapter (CGA) cursor.

This problem was fixed in later versions of the BIOS, as you observed. Installing an EGA or VGA will also solve the problem since these cards carry a replacement video BIOS.

Three ways to produce the ESC character for sending commands to the ANSI screen driver

Can you explain how I can create the "[escape sequence on a Compaq Portable I computer? A friend showed me how to use it to reverse the video, change the screen colors, and so forth. I've installed the ANSI.SYS device driver in my CONFIG.SYS file, but I still can't produce the correct character.—*Clifford N. Nelson; Herndon, Virginia*

The ESC character can be produced in a number of ways. Unfortunately, pressing the Esc key is not one of them. You can use BASIC to issue the ANSI command that clears the screen by entering and running

```
10 PRINT CHR$(27)+"[2J"
```

The BASIC function CHR\$ is used to produce the ESC character, which has a decimal value of 27. The ESC character, followed by a left bracket, is the ANSI command prefix. The 2J is the ANSI instruction to clear the screen.

If you have a text editor that allows all characters to be entered, you can write ANSI control strings directly into your batch files. PC Magazine's TED.COM, which appeared in the November 15, 1988, Utilities column, allows the ESC character to be entered directly into text files.

Finally, the small utility ESCAPE

.COM was published in the January 31, 1989, Utilities column along with our replacement for ANSI.SYS. This small program solves the problem of entering escape sequences at the DOS prompt.

The BAC.COM utility won't copy very large files

The BAC program on your PC Utilities disk has the potential of being a great program—but I can't make it work.

I'm trying to copy a very long file from my hard disk to a 1.2MB floppy disk. BAC works if the file to be copied is less than one floppy disk long. Otherwise, the

■ TED.COM allows the ESC character to be entered directly into text files.

program keeps prompting you to enter a new disk, even if two disks would be enough. When I check the disks it makes under these conditions, there are no files on them at all. Any suggestions?—*Holton E. Harris; Westport, Connecticut*

The BAC program (Utilities, August 20, 1985) employs a very simple algorithm: if the size of the file to be copied is larger than the amount of free space on the target disk, ask for a new disk. So attempting to BAC a file that is 1.4MB, for example, to a 1.2MB drive is doomed to failure. No 1.2MB disk will ever have 1.4MB of free space. BAC also does not split files across disks. Therefore, no file that is larger than the size of the target disk can be copied.

The DEBUG program can be used to examine data files that are larger than 64K

In PC Tutor, September 27, 1988, you discussed the DEBUG program. This brought to mind a problem I have had examining

some large data files with DEBUG. It seems that DEBUG can display only the first 64K of a file. Is there any way I can look at the part of a file that exceeds 64K?—*Dan Kubala; Chicago, Illinois*

DEBUG can be used to examine large files, but it requires a little manual intervention and math on your part. The D (dump) command in DEBUG displays the contents of memory. If you specify a starting address (D 12A4, for example) the dump starts at this address. If not, the dump starts at the end of the previous dump or 100h if it's the first dump. If you specify only an offset, the dump uses the value of the DS (data segment) register for the segment. Unless you specify a segment in the dump command (D F334:1023, for example) or change the value of the DS register, you are limited to examining 64K.

To see more of the file, you must add 1000h to the segment. If, after loading the file, DS=1456, entering

```
RS
DS
2456
```

will change DS to point to the second 64K of the data file. Alternatively, you could simply specify the segment by entering the command

```
D 2456:0
```

to display data after 64K.

Note that this technique won't work with .EXE files. Parts of these files are relocated in memory when they are loaded and are not pointed to by the DS register.

How to prevent some programs from ending batch files prematurely

I like to use DOS batch files to create menu systems. I create my menu screen display using the command TYPE MENU.TXT in my AUTOEXEC.BAT file and at the end of each batch file that executes a program. This works most of the time, but not always.

Often, after the program that's selected by a batch file ends, the command prompt is displayed instead of executing the remaining commands in the batch file. Is there any way to avoid dropping to the

AccountMate[®] 2.0 PLUS IV.

Business Accounting Software
Designed for Change.

AccountMate[®] 2.0 PLUS IV.
Designed to Run Quickly
and Efficiently on
dBASE IV[®] While Main-
taining Compatibility
With dBASE III[®].

Use our powerful, full-featured library of accounting programs as they are, or take advantage of AccountMate's free dBASE[®] source code and modify them to meet your business needs.

AccountMate grows with your business. Each menu based AccountMate module can fully integrate or stand alone. Add more program modules as you need them. AccountMate is also compatible with most popular spreadsheet programs.

Authorized AccountMate consultants are available throughout the U.S. and Canada for dBASE program modifications. Our Clipper[™]-compiled version runs without dBASE.

Call today and find out how productive you can be with the software solution, designed for change.

"An easy-to-run, full-featured system with excellent documentation and performance."
PC Magazine

AccountMate Modules:

- General Ledger
- Accounts Receivable
- Sales Order
- Accounts Payable
- Purchase Order

Payroll

- State Tax
- Job Cost
- Fund Accounting
- Time & Billing
- Consolidated Ledger

Manufacturing

- Inventory Control
- Toolbox
- Transformer
- SearchMate

Nationwide

800-877-8896

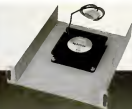
SourceMate[™]

We Produce Solutions.

20 SUNNYSIDE AVENUE, MILL VALLEY, CA 94541-1928 415-381-3001
TELEX: SID 600 5270, ACCOUNTMATE FAX: 415-381-7451

dBASE III and dBASE IV are trademarks of Ashton-Tate, Inc. SourceMate, AccountMate, AccountMate 2.0 PLUS IV, Toolbox, Transformer and SearchMate are trademarks of SourceMate Information Systems, Inc. Clipper is a trademark of Borland Corp. PC Magazine is a trademark of Ziff Communications Co.

CIRCLE 227 ON READER SERVICE CARD



PC DISKSAVER

Has heat destroyed your hard disk and all your valuable data? Are you faced with changing out a hard disk soon...due to bearings failing? Well, join the club! Heat is a cancer to hard disks that will sooner or later destroy them. The new technology disks all produce more heat than desired and many of them will suffer an early death in the confines of your PC system chassis.

The PC DiskSAVER sits below your half height disk drive and cools it 30+ degrees, while operating from your current power supply. The actual life span of your hard disk may increase by several years. The PC DiskSAVER comes in three models and installs easily in any IBM PC, XT, AT, compatible or clone and comes with full instructions.

Order your PC DiskSAVER today.

\$39.95

Plus postage and handling

Toll Free (800) 223-9758

or

In Montana call (406) 777-5511



ATL

American Technology Labs

Dealer Inquiries Welcome—Patent Pending

MASTER SHARE™
allows up to 4 PCs share your
laser printer and another pri-
nter or plotter SIMULTANEOUSLY!

PPS-42

\$245



- ONE YEAR WARRANTY.
- SOFT CODE COMMAND CONTROL NO KEY OPERATION.
- LED INDICATORS SHOW CHANNEL IN USE, READY & BUSY STATUS.
- ENHANCE TRANSMISSION DISTANCE.
- EASY TO USE, NO SOFTWARE IS NEEDED.

Share Your Laser Printer
& peripherals
with our MASTER SHARE™ series!

We also offer:
2 inputs to 1 output
2 inputs to 2 outputs
4 inputs to 1 output
8 inputs to 1 output
8 or 1 Mega byte memory
built-in is optional.
256K, 512K or 1 Mega byte memory
built-in is optional.

Call: (213) 542-0788
Dealer inquiries are also welcome.
P.O. BOX 13944
TORRANCE CA 90503

■ PC TUTOR

prompt? Why does this happen?—Roger Chaloney; Virginia Beach, Virginia

What a program does when it runs and how it returns to DOS can affect the way a batch file is executed. If a program executed by the batch file encounters a critical error, such as attempting to read from an empty disk drive, and the operation aborts, the batch file processing may not be continued when control returns to DOS.

■ **DEBUG** can be used to examine large files, but it requires a little manual intervention on your part.

One method of minimizing the risk of early termination is to insulate the execution of troublesome programs from the parent batch file by executing them with another copy of COMMAND.COM. For example, if the program GOLFERR is causing problems, try these batch file commands:

```
CLS
COMMAND /C GOLFERR
TYPE MENU.TXT
```

Note, however, that using this extra copy of COMMAND.COM will reduce the amount of memory that GOLFERR has to execute in, but all the memory will be freed when GOLFERR terminates.

Ask the PC Tutor

The PC Tutor solves practical problems, explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To have your questions answered here, write to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section). We're sorry, but we cannot answer questions personally.

No matter which of these modes you use,

40-column CGA Text
40-column EGA Text
40-column VGA Text
80-column CGA Text
80-column EGA Text
80-column VGA Text
Lo-res CGA Graphics
Hi-res CGA Graphics
MDA Monochrome Text
80-column VGA Monochrome Text
Lo-res MCGA Graphics
Lo-res VGA Graphics
Med-res VGA Graphics
EGA Monochrome Graphics
Hi-res EGA Graphics
Hi-res MCGA Graphics
Hi-res VGA Graphics

we have the VGA display for it.



Magnavox introduces two new Professional Series displays that are fully compatible with all 17 VGA modes—both designed with the intelligence you've come to expect from Magnavox.

With a VGA display system, you'll get the most out of your present software and prepare yourself for graphics environments like Windows 386, OS/2,[™] and Presentation Manager.[™] Resolutions include 720 x

400 for text, and 640 x 480 in 256 colors for graphics.

Both displays have a 14" CRT, versus the 12" industry standard. And both come with a built-in tilt/swivel base and are backed by a 2-year limited warranty—twice as long as most other brands.

At \$229 for the 7BM749 paper-white monochrome and \$649 for the 9CM082 color display, Magnavox makes VGA displays affordable.

MAGNAVOX

Smart. Very smart.

All these programs

ACTIVISION

SIERRA

Quantum
LORDS OF ORDER

EA
ELECTRONIC ARTS

SPC SOFTWARE PUBLISHING

Broderbund Software

Intuit

EPYX

First Byte

The Learning Company

STAR SOFTWARE SYSTEMS

TANDY

The Children's Writing & Publishing Center

3-STORY

NEWS

have one thing in common:

Desk Mate!

The proven, user-friendly interface

Good news!

Now there's a software system designed to make your PC-compatible computer easier to use than ever before. It's the DeskMate® Graphical User Interface, which leading software publishers are adopting to give their programs a friendlier look and feel.

This new interface gives you a welcome uniformity in operation. It's easy to move from one program to another, and learning new programs is a snap. Now, instead of spending time learning the peculiarities of a new program, you'll be getting more out of your computer!

How does it work?

Very well, thank you. The proven format of the DeskMate Interface uses pop-up dialogue boxes and handy pull-down menus to select operations. Function keys work similarly

from program to program. Bold graphics make it easy to see what you're doing—move around freely and make selections with the keyboard, or use a mouse for "point and click" convenience.

Look at what's available.

When you learn to use one program that uses DeskMate standards, you're well on your way to knowing how to use a library of software. Choose from great titles in everything from word processing and accounting to desktop publishing and home education. And whether you own one or a dozen DeskMate-based programs, you'll appreciate the DeskMate difference in ease of use.

Make it easy on yourself.

Join the revolution that's setting new standards in user friendliness. Look for programs with the DeskMate logo!

**Also available:
the software
package that
started it all!**

*Discover the ease of
use of the DeskMate
User Interface with
DeskMate Applications*



*Software, a versatile
collection of ten great
programs. You get word
processing, spread-
sheet, commun-
ications, database,
graphics and more.
Available at leading
software dealers
nationwide.*

CIRCLE 264 ON READER SERVICE CARD

T DeskMate™
User Interface by Tandy

DeskMate is a registered trademark of Tandy Corporation. Company logos used with permission.



Remote locations with a lot to say need Sync-Up™ V.32

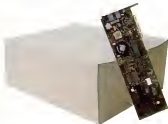
If you have a high-volume communications requirement between your mainframe, mini or micro and your remote locations, Universal Data Systems is ready with the answer.

Sync-Up V.32 is a single-board

emulator/modem that plugs directly into an expansion slot; no external cabling or equipment is required. It is a *true* V.32, compliant in every respect with the CCITT recommendation.

The modem half of the device moves data over ordinary dial-up telephone lines at 9600 bps, full duplex! You can choose an emulator that supports SNA (3270, 3770 or 5251) or BSC (2780/3780 or 3270).

Bring your remote outposts into the mainstream of your data communications system. For detailed specifications and prices, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; FAX 205/830-5657.



Universal Data Systems



MOTOROLA INC.

■ FRANK J. DERFLER, JR.

CONNECTIVITY CLINIC



Shortcuts for loading NetWare drivers for new networking cards; combining operating systems on the same cable is easy; replacing a minicomputer with a LAN.

Today's LAN can replace a minicomputer

PC Magazine has carried articles on big, fast 386 machines, on networks, and on networked databases. What happens when you put the pieces together? Have networked PCs advanced to the point where they can effectively replace a minicomputer?

The association I work for, which serves 55,000 members, would gladly unload its expensive HP 3000 system if a 386-based system could handle 12 active terminals, eight interrelated databases, about 1.5 gigabytes of data on-disk, and a couple of high-speed printers.

Should I call the Compaq, Novell, and Clarion dealers or expect to pour money into the mini for a few more years?

—Henry S. Noble; Gaitersburg, Maryland

Today's LAN hardware and software can do the job for you, but there are some important things you should consider before calling Hewlett-Packard to come and take away its iron. Let's take your requirements one by one.

Twelve active terminals and two printers are no sweat. Three factors are important in delivering service to the terminals: the efficiency of the networking software, the speed of the server's hard disk drive, and the efficiency of the network interface cards. I would use an ALR 386/220, a Compaq 386, or an IBM PS/2 Model 80 as the server. Use ARCnet, Ethernet, or

Token-Ring network interface cards (my preference, in that order) and invest in one high-quality network interface card with a 16-bit or Micro Channel interface for the server.

The configuration of your 1.5-gigabyte datafile is important in selecting your networking software. Novell's *SFT NetWare*, for example, can handle only a maximum volume size of 255MB. You can put up to eight hard disk controllers in a *NetWare* server, and each controller can handle two drives; so you can get plenty of storage, but it is not contiguous.

You can get more contiguous storage (theoretically up to 4 gigabytes) out of *3+Open* running over OS/2, but you will probably have to arrange the drive with very large clusters that make for inefficient storage.

Frankly, I see developing the database structure as the most complex job that you will have to face. You should take plenty

of time and get the application right before you give HP the old heave-ho.

The major advantages you will enjoy by replacing your mini with a LAN include lower life-cycle cost, a wider variety of applications to choose from, and more flexible solutions to future connectivity opportunities. The disadvantage is a slightly more complex environment for database applications and for backing up distributed data. Go for it!

Receiving an unexpected interrupt is a nasty surprise

I use *dBASE III Plus* on a Tandy 3000 that has a PC slave card and runs on a *NetWare*-compatible LAN. My terminal is a Kinttron. Almost every day I get a program lock, and the Tandy reports "unexpected SW interrupt please press (R)eboot." Is it possible that my Tandy can't handle the traffic of the LAN, or are the PC slave board and *NetWare*-compatible LAN by Alloy the problem? And what's the solution?—Jay Stockman; East Rockaway, New York

I ran the Alloy PC-Slave/286 under *NetWare* and didn't find the problem you described in your letter, but I did encounter it on a plain IBM PC AT. Alloy hasn't certified its drivers on the Tandy 3000, and the error message you report comes from the Tandy BIOS.

The amount of traffic isn't the problem, but small incompatibilities between the three busy software systems (Alloy driv-

■ Two advantages of replacing a minicomputer with a LAN are a lower life-cycle cost and a wide variety of applications to choose from.

■ CONNECTIVITY CLINIC

ers, Novell's *NerWare*, Tandy's BIOS) probably are. My first suggestion is to get rid of any TSR programs you have loaded on the Alloy CPU. Also call Alloy and make sure you have the latest version of its driver software—it should be Version 1.01 or later. I wouldn't be surprised if the problem happens when the printer or serial I/O ports are in use on the server. Isolate as many functions as possible to try to find the combination of functions that hangs the operating system.

Mixing operating systems on the same cable is no problem

In Connectivity Clinic, June 28, 1988, you discussed mixing operating systems on an Ethernet network. Can I simultaneously run 3+Share and *NerWare* on a single Ethernet wire if two servers are attached?
—David Solomon (via CompuServe)

Yes, you can simultaneously intermix *NerWare* and 3+Share server operations on the same Ethernet cable or even on the same Token-Ring or ARCnet cabling. The packets or tokens know where they are going and how to traverse the cable regardless of the configuration of the data load they carry.

Even more interesting, if the different workstations are all running NetBIOS or NetBIOS emulation, they can use the same SNA, X.25, fax, or other gateways attached to the cable. The terminal emulators or communications drivers operate independently of the networking software and servers.

The differences among LAN software in the workstations are starting to disappear. Right now you can run the same workstation software for 3+Open, IBM PC Local Area Network Program, IBM Server Manager, and other versions of LAN Manager. Version 2.15 of *NerWare*

will let you run *AppleShare* workstation software in PCs or Macs in place of the *NerWare* shell. As the major companies bring to the market products that support IBM, international, or de facto standards, workstation and cabling differences will disappear quickly.

Loading *NerWare* drivers for new networking cards is easy

I enjoyed your recent review of Ethernet cards, but not many of the cards you reviewed have drivers included in the Novell *NerWare* installation menu. I would like to know how hard it is to install the drivers for new cards that aren't already in the menu Novell ships with *NerWare*.—Bill Loftiss; Peru, Indiana

NerWare comes with many drivers, but there are still more card manufacturers that

More Power For

No single word processor is perfect for all of your users.

Two Fingers Tommy needs a different approach than Blazing Fingers Terry and that's where WordStar fits in. WordStar is the Touch Typists Word Processor.

The Touch Typist's Dilemma

WordStar understands your touch typists' dilemma. You need them to produce good looking business documents and correspondence fast. But they don't have the office's most powerful computers. For these users WordStar's compact size and home row commands make it outperform general purpose function key word processors every time. Touch typists can edit, format, layout, and preview documents much faster with WordStar than with hunt and peck function key word processors.

On the other hand, users in

your department who aren't touch typists might be better off with a function key word processor. Constantly looking at the keyboard doesn't seem to distract non-touch typists.

WordStar Does Best What Your Touch Typists Do Most

WordStar 5 is the latest release of The Touch Typists Word Processor.



send drivers with the network adapters. In the recent Ethernet review, we tested 11 Ethernet cards, and nine of the 11 companies sent their own driver programs for *NetWare*. Each company included instructions in its documentation on how to install the drivers. But after reloading *NetWare* dozens of times, here are the shortcuts we worked out.


If you don't find the LAN driver you need in the *NetWare* menu selection, use an ASCII editor to read the LAN driver sent by the manufacturer. Look for the text string LAN_DRV_NNN (where NNN represents any number), change the NNN to 001, and save the changes. Move the changed LAN file for Version 2.1 of Novell's *NetWare* to the Auxgen and Shgen-1 diskettes. Move the object code (these are the files with .OBJ extensions) to the LAN_DRV_001 disk. This is all that's needed to display the correct LAN driver in the *NetWare* menu.

Find a fast machine to link the operating system with the LAN driver and disk driver. The machine you use for linking can be different from the machine that will finally be the server. If you install a new driver in an existing Novell operating system, always choose the Advanced System Configuration or the Install with Custom Options menu. If you chose the default options, you'll get a workout exchanging disks in the floppy disk drive, but you won't have to work through every menu option. If possible, use a computer with two floppy disk drives to create the operating system—it makes life a lot easier. The final installation of the operating system must be done on the server that's running *NetWare*.

If you are modifying an existing operating system, make a backup copy of the old Osexe-1 and Osexe-2 disks. These disks contain the final object code for the operating system. Save the old copies of the

Osexe disks just in case you need the old version or there is something wrong with the new operating system.

Network Your Questions

Connectivity Clinic gives you practical solutions to networking problems of all types. We'll pay \$50 or more for any tips we print, *plus an extra \$25 if you submit your letter on a disk*. If you do, please include a printed copy. We'll gladly answer your questions at no charge, but we cannot answer letters personally. Mail contributions to Connectivity Clinic, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Productivity section). You may also contact Frank J. Derfler, Jr., via MCI Mail (use Derfler's box named CONNECTIVITY CLINIC). 

Your Touch Typists.

Without stopping to hunt for function keys WordStar users can:

- ◇ lay out pages with up to 8 snaking columns
- ◇ create footnotes for each page or

at the end of the document

- ◇ import Lotus 1-2-3 and dBase files without conversion
- ◇ customize mailings
- ◇ view documents as they will print

including exact fonts and sizes—even view multiple pages at once.

Thousands of touch typists know and use WordStar. And thousands are more productive on WordStar than they could ever be on a general purpose function key word processor. The timelessness of the WordStar success story is as simple as that.

If there are touch typists in your department or workgroup turn to The Touch Typists' Word Processor. Turn on the power of WordStar.

For more information about how WordStar can help you get the most out of your workgroup's touch typists see your dealer or call 1-800-227-5609, ext. 615.

WORDSTAR.5

All trademarks acknowledged. © 1989 MicroPro International Corp., 33 San Pablo Avenue, San Rafael, CA 94903, (415) 499-1200.

CIRCLE 480 ON READER SERVICE CARD

PC MAGAZINE ■ APRIL 11, 1989

We make a super VGA monitor



NEC introduces the best VGA monitor you can
buy. MultiSync® 2A.

The first monitor that takes our award-win-
ning multiple frequency technology and cus-

tomizes it to the needs of the VGA user.

MultiSync 2A is both affordable and uncompromised. And
completely compatible with all VGA modes. In short, it performs
brilliantly. But what's equally important, it allows you to move
effortlessly to the next major graphics standard: SuperVGA.

All this in a monitor that gives you a 14" non-glare screen on
a tilt-swivel base, for nearly 30% more viewing area than stan-
dard 12" screens, and a new cabinet that's not only functional but is
designed to look as good from the back as it does from the front.

MultiSync 2A. One super VGA monitor.

VGA mode shown at 60 Hz 1.25



Computers and Communications

that's also a SuperVGA monitor.



But that's only part of the story. NEC also introduces the best SuperVGA monitor you can buy. MultiSync® 2A.

The first monitor that takes our award-winning multiple frequency technology and customizes it to the needs of the SuperVGA user. MultiSync 2A senses the software you're using and makes the switch from a VGA monitor to SuperVGA, the new standard developed by NEC and recognized by VESA, the Video Electronics Standards Association. SuperVGA delivers a maximum resolution of 800 x 600, which is 56% higher than VGA.

And since you're most likely buying a board that goes beyond VGA, your monitor should too. For literature call 1-800-826-2255. For technical details call NEC Home Electronics (USA) Inc. at 1-800-FONE-NEC.

MultiSync is a registered trademark of NEC Home Electronics (USA) Inc.

MultiSync 2A. One SuperVGA monitor.

© 1989 NEC Home Electronics (USA) Inc.

NEC

Count on CompuAdd.

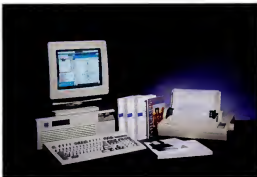
CompuAdd Starter Kits provide a great way to get into personal computing immediately. We've bundled computer and keyboard, hard drive, monitor, printer, software and all the accessories and supplies you need to get started, and packaged them in a specially priced kit. And we've created an assortment of Starter Kits to meet the price and performance needs of a variety of users.

Executive Starter Kit™

- **Computer:**
CompuAdd 386/16
 - 80386-16 processor providing 16MHz, 8MHz, 6MHz, or 4.77MHz software selectable system speeds
 - 0 wait state (Page-mode)
 - 1MB RAM expandable to 4MB (Option to 10MB RAM)
 - 5.25" 1.2MB floppy drive
 - Dual floppy/hard drive controller
 - Five 16-bit and two 8-bit expansion slots
 - 80287 math coprocessor support
 - Choice of AT-style, 5151, or enhanced 101-key keyboard
- **Monitor**
Monochrome monographics video package, or enhance your system with EGA or VGA video.
- **Hard Drive**
40MB fully installed, or upgrade to a higher capacity drive.
- **Printer**
Epson™ LX-800
 - 180cps draft, 30cps near letter quality
 - Multiple type styles
 - Tractor/infrinction paper feed
- **Software**
 - CompuAdd INTEGRATOR™ Program/file managers, cardfile database, calendar, calculator, text editor, and PC-FullBak™
 - CompuAdd MS-DOS® and GW BASIC®
- **Accessories**
 - 200 sheets of continuous form paper
 - Printer cable and ten blank floppies

\$2695

Hard Drive	MGA	EGA	VGA
40MB	\$2695	\$3095	\$3245
71MB	\$2865	\$3265	\$3415



Professional Starter Kit™

- **Computer:**
CompuAdd 286/12
 - 80286 processor providing 12MHz and 6MHz switchable system speeds
 - 512KB RAM expandable to 1MB
 - 5.25" 1.2MB floppy drive
 - Dual floppy/hard drive controller
 - Eight expansion slots
 - Math coprocessor support
 - Choice of AT-style, 5151, or enhanced 101-key keyboard
- **Monitor**
Monochrome monographics video package, or enhance your system with EGA or VGA video.
- **Hard Drive**
20MB fully installed or upgrade to a higher capacity drive.
- **Printer**
Epson LX-800
 - 180cps draft, 30cps near letter quality
 - Multiple type styles
 - Tractor/infrinction paper feed
- **Software**
 - CompuAdd INTEGRATOR Program/file managers, cardfile database, calendar, calculator, text editor, and PC-FullBak
 - CompuAdd MS-DOS and GW BASIC
- **Accessories**
 - 200 sheets of continuous form paper
 - Printer cable and ten blank floppies

\$1595

Hard Drive	MGA	EGA	VGA
20MB	\$1595	\$1945	\$2145
40MB	\$1715	\$2065	\$2265

Career Starter Kit™

- **Computer:**
CompuAdd Turbo/10
 - 8088 processor providing 10MHz and 4.77MHz switchable system speeds
 - 640KB RAM
 - 5.25" 360KB floppy drive
 - Floppy drive controller
 - Eight expansion slots
 - Math coprocessor support
 - Choice of AT-style, 5151, or enhanced 101-key keyboard
- **Monitor**
Monochrome monographics video package, or enhance your system with EGA or VGA video.
- **Hard Drive**
Optional hard drive.
- **Printer**
Ster Micronics NX-1000™
 - 120cps draft, 30cps near letter quality
 - Multiple type styles, nine-pin print head
 - Tractor/infrinction paper feed
- **Software**
 - Professional Zen Software A totally integrated software package: ZenWord™, ZenCalc™ and ZenLink™ PC-FullBak software with optional hard drive
 - CompuAdd MS-DOS and GW BASIC
- **Accessories**
 - 200 sheets of continuous form paper
 - Printer cable and ten blank floppies

\$929

Hard Drive	MGA	EGA	VGA
No Hard Drive	\$929	\$1279	\$1479
20MB	\$1179	\$1529	\$1729

CompuAdd systems deliver some surprising numbers for remarkably low prices.



CompuAdd designs and manufactures a full line of affordable, reliable computers employing proven 80286/80386 technology. These systems are earning a reputation for dependability in thousands of demanding business and institutional applications every day.

CompuAdd backs every system with a 30-day money-back guarantee and a full one-year warranty. Expert on-site service is available from Memorex Telex Corporation.

Our experienced technical support personnel answer your installation and operation questions and solve most problems immediately by toll-free telephone. When required, CompuAdd will send you a new exchange part within 48 hours shipped Federal Express®. We pay the freight both ways.

CompuAdd 386/16

- 80386-16 processor running at 16MHz, 8MHz, 6MHz, or 4.77MHz switchable-selectable system speeds
- 0 wait state (page-mode memory)
- 1MB RAM expandable to 4MB (Option to 10MB RAM)
- CompuAdd INTEGRATOR™ productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Five 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Choice of enhanced 101-key, AT-style, or 5151 keyboard
- 17.6 on Norton's SI Benchmark 4.0 test

\$1895

CompuAdd 286/12

- 80286-12 processor running at 12MHz or 6MHz, switchable system speeds
- 0 wait state
- 512KB RAM expandable to 1MB
- CompuAdd INTEGRATOR productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Choice of enhanced 101-key, AT-style, or 5151 keyboard
- 13.7 on Norton's SI Benchmark 4.0 test

\$995

CompuAdd 286/10

- 80286-10 processor running at 10MHz or 6MHz, switchable system speeds
- 512KB RAM expandable to 1MB
- CompuAdd INTEGRATOR productivity software package
- Choice of 5.25" 1.2MB or 3.5" 1.44MB floppy drive
- Dual floppy/hard drive controller
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Choice of enhanced 101-key, AT-style, or 5151 keyboard
- 9.4 on Norton's SI Benchmark 4.0 test

\$895

CompuAdd Turbo/10

- 8088 processor running at 10MHz or 4.77 MHz switchable speeds
- 640KB RAM
- 5.25" 360KB half-height, dual-sided floppy drive
- Dual floppy disk controller board
- Eight XT-compatible expansion slots
- Math coprocessor support
- Front panel display with keylock, reset button, turbo button, plus LED indicators
- Choice of enhanced 101-key, AT-style, or 5151 keyboard

\$595

386/16 System	MGA	EGA	VGA
40MB, 28ms	\$2,449	\$2,799	\$2,999
60MB, 28ms	\$2,895	\$3,045	\$3,245

286/12 System	MGA	EGA	VGA
20MB, 65ms	\$1,399	\$1,699	\$1,899
40MB, 40ms	\$1,579	\$1,879	\$2,079

286/10 System	MGA	EGA	VGA
20MB, 65ms	\$1,249	\$1,599	\$1,799
40MB, 40ms	\$1,429	\$1,779	\$1,979

Turbo/10 System	MGA	EGA	VGA
No Hard Drive	\$729	\$1,079	\$2,999
20MB, 65ms	\$999	\$1,349	\$1,549

Order Toll Free: **800-666-1872**

Customer Service: **800-999-9901** Fax: **512-250-5760**

Telex: 763543 COMPUADD AUS USA: 512-258-5575

CompuAdd
CORPORATION
12303 Technology Blvd. Austin, Texas 78727

Count on CompuAdd.



AT[®] Hard Drives

Drives include cables, mounting hardware, manual and **FREE PC-FullBak[™]** disk backup software.

43MB MiniScribe [®] (25ms)	\$459
71MB MiniScribe (28ms)	
(Reg. \$649)	\$569
80MB Seagate [®] (28ms)	\$669
117MB Seagate (28ms)	\$869

XT[®] Hard Drives

Drives include cables, mounting hardware, controller card, and **FREE PC-FullBak** disk backup software.

20MB MiniScribe (65ms)	\$279
30MB Seagate (65ms)	\$310
40MB MiniScribe (61ms)	\$379
20MB MiniScribe (65ms)	
for Compaq Portable	\$299

Tandy[®]-Compatible Hard Drives

20MB MiniScribe (65ms)	
For 1000/A	\$319
For SX/TX	\$319
For 3000HL	\$375
40MB MiniScribe (61ms)	
For 1000/A	\$395
For SX/TX	\$395
43MB MiniScribe (25ms)	
For 3000HL	\$749

FlashCards

FlashCard-20 [™]	
MiniScribe (65ms)	\$299
For Tandy-compatibles	\$359
FlashCard-30 [™]	
MiniScribe (65ms)	\$339
For Tandy-compatibles	\$379
FlashCard-49 [™]	
Seagate (40ms)	\$539

I/O Cards

AT I/O serial port and parallel port (Reg. \$59)	\$49
XT I/O serial port, parallel port, clock/calendar, and game port	\$65

Diskette Drives

360KB half-height 5.25" floppy drive for the XT (black)	\$99
360KB half-height 5.25" floppy drive for the AT (gray)	\$109
720KB half-height 3.5" floppy drive for the XT (black)	\$109
720KB half-height 3.5" floppy drive for the AT (gray)	\$115
1.2MB 5.25" floppy drive for the AT (gray)	\$109
1.44MB half-height 3.5" floppy drive (gray) (Reg. \$135)	\$89
Personal System/2 [™] compatible external drive installs as drive B and permits transfer from 360KB to 720KB format	\$199

Monitors

MGA	
12" flat screen monitor with tilt/swivel	\$95
Amdek [®] 210A monitor	
12" non glare screen	\$109
Amdek 432W monitor with flat screen and tilt/swivel	\$220
CGA	
IBM-compatible color monitor 13" diagonal screen	\$239
EGA	
IBM-compatible 13" EGA monitor	\$349

VGA

Color VGA 13" analog monitor	\$515
Zenith 14" Color VGA 640x480	\$759

Video Cards

Monographics card up to 720x348 resolution	\$49
Hercules Monochrome Graphics Card Plus up to 720x348 resolution	\$179
Hercules [™] Color Graphics card for AT on a half-size card	\$149
CompuAdd EGA-480 IBM/EGA-compatible card with 256KB display memory	\$179
CompuAdd VGA card 800x600 resolution, 16/256K colors, supports IBM VGA, CGA, and Hercules Monochrome graphics	\$220
Video-7 [™] Vega VGA card 640x480 and 800x600 resolutions with 16/64 color capability	\$279

Monitor/Card Combos

Monographics 12" flat screen with tilt/swivel, monographics card	\$139
CGA 13" IBM-compatible monitor with 640x240 resolution plus, CGA graphics card	\$279
EGA 13" IBM-compatible monitor with 640x350 resolution, plus EGA graphics card	\$489
VGA 14" analog monitor with 256 colors, plus VGA graphics card	\$695



Multifunction Boards

AT Multifunction board with 0KB, up to 15MB RAM expansion, serial, parallel and game ports, for ATs and compatibles (Reg. \$99)	\$85.99
XT Multifunction board with 384KB RAM, parallel port, serial port, clock/calendar, and game port for PCs or compatibles	\$199

Memory Cards

MEM-576 with 0KB	\$35
EMS XT with 0KB	\$99
EMS AT with 0KB	\$119
Intel Above [™] Board Plus with 512KB	\$455

Modems

1200 baud CompuAdd (internal)	\$69
1200 baud CompuAdd (external)	\$89
Everex Evercom [™] 1200 baud (internal)	\$89
Hayes Smartmodem [™] 1200B 1200 baud (internal)	\$299
Hayes Smartmodem 1200B 1200 baud (external)	\$319
2400 baud CompuAdd (internal)	\$139
2400 baud CompuAdd (external)	\$159
Everex Evercom 2400 baud (internal)	\$149
Hayes Smartmodem 2400B 2400 baud (internal)	\$449
Hayes Smartmodem 2400B 2400 baud (external)	\$469

Pointing Devices

Logitech [®] HiREZ Mouse with 320 dots per inch resolution capabilities.	
Bus interface	\$109
CompuAdd Serial Mouse features Dr. HALO III [™] , pad, and pocket	\$55
Genius Digitizer Tablet provides resolutions up to 1000 lines per inch on a 12" x 12" work area. Includes Dr. HALO III software	\$309
CompuAdd Joystick	\$19.95
Mach III Joystick	\$35

CompuAdd
CORPORATION

12303 Technology Blvd.

Austin, Texas 78727

Order Toll Free: **800-666-1872**

Customer Service: 800-999-9901

Fax: 512-250-5760

Telex: 763543 COMPUADD AUS

USA: 512-258-5575

CompuAdd offers everything for personal computing.

Phone now. We'll pay for the call.

Printers

Okidata 321 132 columns,	
250cps draft, 63cps NLO	\$529
Epson® LX-800 80 columns,	
160cps draft, 30cps NLO	\$209
Epson FX-1050 132 columns,	
264cps draft, 51cps NLO	\$479
Epson EX-800 80 columns,	
300cps draft, 60cps NLO	\$395
Epson LQ-500 80 columns,	
180cps draft, 60cps NLO	\$305
Epson LQ-1050 132 columns	
264cps draft, 88cps LQ	\$799
Panasonic® 10911 80 columns,	
192cps draft, 38cps NLO	\$219
Panasonic 1595 132 columns,	
240cps draft, 51cps NLO	\$479
Panasonic 1124 80 columns,	
192cps draft, 63cps LQ	\$389

Switch Boxes

Manual	
25-pin (serial or parallel)	
X (2/2)	\$35
AB (2/1)	\$13
ABC (3/1)	\$29
ABCD (4/1)	\$33



36-pin Centronics	
X (2/2)	\$35
AB (2/1)	\$29
ABC (3/1)	\$29
ABCD (4/1)	\$33
Automatic	
Serial (4/1)	\$75
Serial (8/1)	\$99
Parallel (4/1) (Reg. \$79)	\$55.99
Parallel (8/1)	\$99

Tape Backups

40MB Internal (AT)	\$359
40MB Internal (XT)	\$359
60MB Internal	\$757
60MB External	\$849

Math Coprocessors

8087-3	\$119
8087-2	\$159
80287-6	\$179
80287-8	\$259
80287-10	\$299
80387-16	\$499
80387-20	\$569
80387-25	\$699

Keyboards

AT-Style 5080 keyboard	
has 84 keys and enlarged	
ENTER and SHIFT keys for	
easy operation	\$69
Enhanced 101-key	
keyboard for AT or XT	
compatibles with 101 keys	
Including 12 function keys	\$69
5151 keyboard for the IBM	
AT, XT, and compatibles.	
Includes separate numeric	
and cursor key pads	\$69

Software

For IBM® compatibles	
Communications	
Carbon Copy Plus®	\$113
Carbon Copy Plus (3.5")	\$113
CompuServe®	
Subscription Kit	\$21
Crosstalk XVI®	\$103
Smartcom II®	\$87

Compilers and Languages

Microsoft® C Compiler	\$312
Microsoft FORTRAN	
Optimizing Compiler	\$312
Microsoft Macro Assembler	\$102
Microsoft QuickC™	
Compiler	\$67
Microsoft QuickBASIC™	\$69
Turbo C®	\$108
Turbo Pascal®	\$108

Desktop Publishing

Aldus PageMaker®	\$577
FONTSY™	\$36
PFS: First Publisher	\$76
PFS: First Publisher	
Art Gallery	\$75
PrinterMaster Plus™	\$32
NewsMaster II™	\$49

Databases

dBASE IV™	\$485
PFS: Professional File	\$145
Q&A™	\$199



TAX SPECIAL
Prepare your 1988 federal tax return with Tax Advantage™ II at the unbeatable price of...
Reg. \$74.95
Only... \$29.95

Financial

DAC-Easy™ Accounting	\$59
DAC-Easy Light™	\$42
DAC-Easy Payroll™	\$59
Managing Your Money®	\$129
Quicken®	\$30
Sylvia Porter's Investment Manager™	\$89
Timestips® III	\$117

Games

Flight Simulator	\$35
Flight Simulator (3.5")	\$35
King's Quest™ IV	\$29
Gunship™	\$30
Leisure Suit Larry Goes Looking for Love™	\$29
Manhunter	\$29
Mean 18 Golf	\$24
Police Quest II™	\$29
Scrabble	\$26
Test Drive	\$26

Integrated Packages

Framework II™	\$450
Microsoft Works	\$99
PFS: First Choice	\$95
Symphony®	\$449
Symphony (3.5")	\$468

Organizational

Harvard™ Total Project Manager II	\$425
Microsoft Project	\$345
Time Line™	\$288
Time Line (3.5")	\$288

Spreadsheets

Microsoft Excel	\$339
Quattro™	\$165
VP-Planner®	\$53
Lotus 1-2-3® (Reg. \$329)	\$299

Utilities

Copy II® PC	\$25
Disk Optimizer™	\$41
FASTBACK Plus (3.5")	\$97
Norton Commander	\$47
Norton Utilities™ Advanced	\$79
PC-FulBeck™	\$49
PC Tools® Deluxe	\$40

Word Processors

Gram-mat-ik III™	\$52
Microsoft Word	\$229
MultiMeta Advantage II™	\$289
PFS: Professional Write	\$116
Q&A Write™	\$111
WordPerfect® (Version 5.0)	\$243
WordPerfect (3.5")	\$245
WordStar® Professional	\$250

CompuAdd

We offer the best service and support available in the mail order industry, so you can purchase with confidence:

- FREE one-year limited warranty
 - FREE 30-day money back guarantee
 - FREE one year of technical phone support
 - FREE credit card ordering — no surcharge
- Please add 2% to all purchases for shipping and handling (minimum \$3, shipping outside the continental US will increase cost). Add 5% for shipping/handling to APO/FPO addresses (Minimum \$5). All return items must be accompanied by a Return Merchandise Authorization number; call our technical support/customer service department. Prices are subject to change without notice. Arizona, Colorado, Florida, Georgia, Kansas, Missouri, and Texas residents, please add appropriate local sales tax. Thirty-day money back guarantee does not include return freight, or shipping and handling. Software is non-refundable.

We accept MasterCard, VISA, money orders, certified checks, personal checks (please allow 10 days for processing). C.O.D. (\$50 minimum order), company and institutional purchase orders, and wire transfers.

Corporate and Institutional Accounts

We are dedicated to establishing the professional service you require to keep your business running smoothly. We accept purchase orders on a net terms basis with approved credit and a minimum initial purchase of \$500. We provide a full-time technical staff to answer your questions and make fast deliveries. Invoiced. Call us today!

800-456-3116
CompuAdd is an established leader in the computer industry. We offer superior prices, products, customer support, and service!
Fax: 512-250-5760
Telex: 763543 COMPUADD AUS
Outside United States: 512-258-5575

Order Toll Free: **800-666-1872**

Customer Service: 800-999-9901 Fax: 512-250-5760

Telex: 763543 COMPUADD AUS USA: 512-258-5575

CIRCLE 294 ON READER SERVICE CARD

CompuAdd
CORPORATION
12303 Technology Blvd. Austin, Texas 78727

Your BEST Source for Laptops



TOSHIBA

321SL Narrow 419

341SL Wide 559

TOSHIBA

T1000 729

768K CARD 249

T1200HB 2299

T3100E 2599

DICONIX 150 Parallel ... 299

With Purchase of Any Laptop .. 269



MITSUBISHI 296L-20 MB 2349 IBM MultiSpeed EL II 1479 MultiSpeed W/ 20 MB 2299 Battery Pack-Specify EL or HD 99 Floppy 5.25" Ext. 300K for HD 299 Modem 1200/2400 Int 269/339 TOSHIBA LAPTOPS T1000 729 T1200 1299 T1200FB 1499 T1200HB 2299 T1800 3099 T3100E 2599 T3200 3399	ACCESSORIES for Toshiba Laptops AC Adapter: T1000/T1100+ 69 AC Adapter: T1100/220 volts for T1200/T1600 99 Auto Adapter: T1000/T1100+ 99 Battery Charger: T1200/T1800 239 Battery Pack: T1200/T1800 79 Carry Case by Toshiba 99 Fabric: T1000/T1100/T1200 99 Fabric: Other Models 99 Leather: T3100/3200/5100/5200 249	Designer Carry Case w/pockets for SW, manuals, portable printer etc 149 Specialty model 899 Expansion Card 299 WotUnder: Single expansion slot 299 Floppy 5.25" Ext. 300K 299 MEMORY EXPANSION T1000: 768K Card 249 T1200: 1MB 649 T1600: 2MB 949 T1800: 1MB 649 T3100E: 2MB 949 T3200: 3MB 1299 T3200: 2MB 1099	MODEMS CALL FWC 1200/1800/3100/5100/5200 249 Toshiba 1200 Int 249 Toshiba 2400 Int 299 Megahertz 1200 Int 149 Megahertz 2400 Int 199 Prometheus 1200 Int 129 Prometheus 2400 Int 229 AdaptaModem 2400 Int 229 World Port 1200 Ext 159 World Port 2400 Ext 259 Toshiba cable for Ext Modem 39 Numeric Keypad: Specialty model 99 Battery Watch 39 Laplink Plus 99
---	--	---	---

PRINTERS ALPS Allegro 259 ALQ 324II 699 * DICONIX InkJet 180 parallel with 3" or 5" cable 299 with any Laptop 299 NEC P2200 Parallel 329 5200/5300 499/659 Color KJ 5200/5300 1099 PANASONIC 1592 399 1595 399 TOSHIBA 311 321 SL 419 341 SL 559 KENNINGTON Printer Stand 299 * With Printer 10 *	DRIVES & BACKUP PLUS HARD CARD: 20 MB 499 40 MB 599 SHARP 3.5" Internal with Universal mounting kit 99/109 720K/1.44 MB 69/109 SEAGATE: For PC/XT HALF HT PRO PACK 20 MB (ST 225) 259 PRO PACK 30 MB (ST 238) 279 Fully Pretested, PRO PACK Includes controller, cables, detailed & illustrated manual. Six months warranty. PC/XT Mating Kit & Filler Plate 49 MOUNTAIN: Uses Floppy Controller 40 MB Back-up. Internal for AT 379 DC 2000 Single/Box of 5 25/120	SOFTWARE BONANZA All software is factory sealed & comes complete with manuals. BATTERY WATCH Ver 1.0 - 3.5" 39 BITCDROM 3 Ver 3.5 - 5.25" 39 BORLAND Sidekick: Spdy 5.25 or 3.5/50 39 WORDSTAR Sprint Ver 1.0 - 3.5" 89 CARBON COPY Plus Ver 1.5 - 3.5" 49 GEN GRAPH 5.25" 49 LAPLINK PLUS 99 LOGI Paint/LOGI Cadd 29/49 LOGITECH Publisher 49 LOTUS Memo 3.5" Ver 1.0 49 MICROSOFT Windows 365 Ver 2.0 - 3.5" 99 PC K/WK: Power Pak Ver 1.1 - 3.5" 49 PC PRINT: Plus - 5.25" 29 WORDSTAR EASY Ver 1.5 - 3.5" 49	FAX MACHINES/BOARDS PANAFAX UF-155 999 SHARP PC-230 899 SHARP LX-180 869 SHARP PC-420 1199 SHARP LX-300 1199 MURATA M1200/M1500 549/749 QUADRAM JT Fax Board 4800 279 JT Fax Board 9600 549 JT Fax Portable 4800 349 THE COMPLETE PC Fax Board 4800 249 Fax Board 9600 499
---	--	---	--

MONITORS LOGITECH AutoSync with EGA Card, LogiMouse & Paint Show 599 SONY 1311 to IBM Cable 429 MITSUBISHI D Scan 1371 479 Diamond Scan 1381 479 Diamond Scan Tile & Serial - add 20 NEC 1402 MultiSync II 599 1402 MultiSync 2A Super VGA 499 1404 MultiSync 3D 699 MultiSync Plus 699 SONY 1311CR-13" Trinitron Color Remote Tilt & RGB Monitor 549 Sony 1311 to IBM Cable 20 SONY Multiscan 1303 599 SONY Multiscan 1302 599 Sony 1303/12 to IBM Cable 20 Sony 1303/12 to MAC II Cable 39 TASAKI 770 MultiVision plus 529 ZENITH ZCM-1480 Flat Screen 599 Zanussi Tilt 9 Sweivel 39 UNIVERSAL Tilt & Sweivel 20	KEYBOARD/MOUSE KEYTRONIC 101 Plus Professional for PC/XT/AT 109 OEM Version: Identical to 101 with 90 day warranty from us 59 Keytronic Mouse 99 Bus or Serial 99 LOGITECH PS/2 Mouse 79 C-7 Serial or Bus 69 HiRez Bus 99 Serial w/ Clear Case 99 Logitech Publisher 49 LogiPaint/LogiCadd 29/49 MICROSOFT Mouse: Bus or Ser 109 With Windows 149 MOUSE SYSTEMS w/PC Paint Plus Serial or Bus 99 QUADRAM Optical Mouse 79	MATH/RAM CHIPS 64K RAM 120 no Set of 8 39 286K RAM CALL 8687-2 PC/XT 5 MHz 139 86287-4 AT 8 MHz 215 86287-10 AT 10 MHz 239 86287-18 for 385 machines 379 86287-20 for 386 machines 469 86287-25 for 386 machines 599 MODEMS Also See Under Laptop HAYES 1200B Internal - No SW 249 1200B with SmartComm II 269 TOUCHABLE SYSTEMS World Port Pocket 1200 Ext 159 2400 Ext w/AC Adapter 299 200M 2400 Internal w/sw 129 2400 External w/sw 149	DISPLAY CARDS ATI VGA Wonder (256K) 319 GENOA SuperEGA Hites 179 SuperVGA Hites 5000-10 379 ORCHID Pro Designer VGA 329 Pro Designer VGA Plus 429 PARADISE VGA Plus 269 Paradise VGA Plus 18 269 Paradise VGA Professional 499 VIDEO-7 Vega VGA 269 FastWrite VGA 329 Vega V-RAM VGA (256K) 499 ZENITH Z-449 249 6 to 15 Pin Connector-Required for some Monitor/Card combinations 20
---	---	---	---

SUPER SPECIALS GENOA Super EGA Hi Res+ 159 TOSHIBA 321SL/341SL 399/539 TOSHIBA 1200HB/3100E 2259/2559	* PREPAID BY CHECK ONLY * * POSTMARKED BY APRIL 10, 1989 *
---	---

POLICY: Min. order \$100 for CDD/Credit Cards. Prepared orders: Min. \$50. Prices & availability subject to change. Shipping charges vary (Min. \$10). Credits: Prices reflect discount for advance payment. Add 2% (Min. \$5) for CDD or Discover, 3% for MC/Visa and 5% for Amex or Optima. CDD requires cash or cashier check. No charge for return sales. All sales final. Returned shipments entitled to a 20% charge (Min. \$20). Not responsible for compatibility. *PC/XT/IBMs: Mon-Fri, 9 to 5 pm. PLEASE CALL FIRST FOR WORKORDER #.

FOREIGN ORDERS: For foreign orders add special handling charge of \$30 per order. Air shipments add 10% (Min. \$50). For Printers & Monitors 30% (Min. \$150). Some items may be more. Credit card orders, add 5% to amount owed. FAX: 714-891-2364

★ FREE DELIVERY ★
 * PREPAID ORDERS IN CONTINENTAL U.S. ONLY *
 Simply mail the check for the exact amount (CA add 6%) as shown here with your order. We will ship your order UPS Ground, FREE of any other charges. It is that simple. Money order/Bank check orders shipped immediately. PERSONAL CO. checks delay shipment 2/3 weeks. (Credit Card orders are not considered prepaid).

MICROBEST **74-897-2100**
 12605 HOOVER STREET, GARDEN GROVE, CA 92641
 PLEASE REFER TO AD # PC 910

HEADSTART III. SAVE \$500

**HeadStart III™ delivers speed, power and performance.
PC Network delivers the savings.**

HeadStart III is the first advanced system to come complete with all the features advanced users need and expect... All in one ready to run package! Nothing extra to buy - and no hassles putting it together!

HeadStart III comes complete with all these powerful, advanced features:

- Multi-tasking capability
- DOS/2 ready
- Dual format - runs 5.25" and 3.5" diskettes
- 640-1 VGA graphics
- 1MB of RAM - expandable to 3MB
- Complete library of business and professional software
- Easy to use HeadStart Advanced Operating Environment
- 3-button Mouse

UNIQUE DUAL FORMAT

With HeadStart III, you don't have to worry about whether you've made the right choice of operating systems. A 1.44MB 3.5" and a 1.2MB 5.25" floppy drive are both built in. Create new files using high capacity 3.5-inch OS/2 diskettes and still run all your current files stored on 5.25-inch DOS diskettes.



On top of all this, HeadStart III is OS/2 ready. It runs the kinds of powerful applications businesses today can't do without.

MULTI-TASKING SPEED AND POWER

Enter data, print out, perform analyses...HeadStart III easily does several things at once. With HeadStart III attached to the host or acting as a file server, your people can each do their job without interrupting yours.

HeadStart III's 80286 CPU and 1MB installed RAM, in tandem with 32MB hard disk drive with an astonishing 1 to 1 interleave, store all your information...and then get it to you the instant you need it.



**PC NETWORK EXCLUSIVE...
ORDER NOW AND SAVE \$500!**

VENDEX™ HEADSTART™ III

**Buy the complete HeadStart III
System with VGA Color Monitor
and save \$500. Or, lease it for
as low as \$99 a month..**

HEADSTART III SPECIFICATIONS

MICROPROCESSOR: Intel 80286-1	HARD DRIVE: 32MB, 28 milliseconds, 1:1 interleave
SPEED: 10MHz/4.77 Switchable	BUILT-IN
BIOS: Award	INTERFACES: Parallel 2-80232 serial, mouse, joystick
BUILT-IN RAM: 1MB	EXPANSION SLOTS: Six 815 slots (3 available to user)
ROM: 20K	MOUSE: Standard Opto-mechanical
EXPANDABLE TO: 3MB	POWER SUPPLY: 145 watts 115/220 switchable
KEYBOARD: 101 key "PS/2" compatible	
GRAPHICS: VGA Adaptive	
FLOPPY DRIVES: One 1.2MB 5.25" One 1.44MB 3.5"	

A GRAPHIC IMPROVEMENT

Whether you're an expert in desktop publishing or accounting, HeadStart III's true 16-bit built in VGA graphics will bring out the art in you. Create your own visuals or display color photos every bit as sharp and brilliant as the original, in up to 256 colors at once from a palette of 256,000!

Build up HeadStart III as you build up your business. Attach modem, printers and other peripherals without ever opening the back. And use the 3 full size "AT" compatible expansion slots for networking, adding a fax card or installing an internal modem.

BRAND NAME PROGRAMS...FREE!

On top of the unique HeadStart Advanced Operating Environment that makes it so easy to master, HeadStart III includes thousands of dollars worth of top-selling applications software FREE.

- Floppy Driver™
- Bookmark Plus™
- Framework II™ by Ashton-Tate
- Perspective Three-D Graphics™
- Twist & Shout™
- Publish-It™
- Speech™
- XTree™
- Computer-Ease™
- AT™ Skill Builder
- Chessmaster™ 2000

SUPPORT YOU CAN COUNT ON

1-800-PC-COACH

When you need assistance or have technical questions about your hardware or software, simply call 1-800-PC-COACH - The nationwide hot-line available only to registered HeadStart III owners.

18 MONTH ON-SITE SERVICE

HeadStart III is backed by a full 18-month Limited Warranty on parts and labor. Should service be required, a trained technician from the nationwide Harris consumer network will be sent to your location at no charge during the warranty period.

LEASE AS LOW AS \$99/MONTH

PC Network can custom design a leasing program to fit your business needs. It gives you 100% financing to free your working capital or credit lines, and lets you enjoy substantial tax advantages.

PC NETWORK IS A MEMBER OF THE



MAJOR CREDIT CARDS ACCEPTED

HRS: MON. - FRI: 8:30 AM - 6:00 PM
SAT: 10:00 AM - 4:00 PM

PMO489

PC NETWORK

1-800-621-SAVE 625 ACADEMY DRIVE NORTHBROOK, IL 60062

*HeadStart III is an FCC Class A device, intended for business use only.

CIRCLE 353 ON READER SERVICE CARD

PC NETWORK. SERVICE



**THE™
PC+ TURBO XT/10
SYSTEM**



\$679

• Intel 8086-1 Switchable from 4.77 to 10MHz • 512K RAM Expandable to 640K • 360K Floppy Drive • Dual Floppy Controller • 150 Watt Power Supply • Mono/Color Video Graphics Board • 12" Monochrome Monitor • 1 Serial/1 Parallel/1 Game Ports & Clock • 101 "AT" Style Key Keyboard • FREE 1 Year Warranty.

Complete Systems With Color Monitors

CGA Color System	\$869.
EGA Color System	\$1079.
CGA w/20MB	\$1149.
EGA w/20MB	\$1369.

THE™ COMPLETE 40MB 286/12 PROFESSIONAL SYSTEM

\$1579

• 12MHz Switchable Speed • 512K RAM Expandable to 1024K • 1.2MB Mitsubishi Disk Drive • FDC/HDC Dual Controller • 40MB Seagate 28MS (ST251-1) Hard Drive • 1 Serial/1 Parallel/1 Game Port • Color/ Mono Graphics Card • 101 "AT" Key Keyboard • 200 Watt Power Supply • 12" Monochrome Monitor • FREE 1 Year Warranty

40MB Systems With Color Monitors

CGA Color System	\$1779.
EGA Color System	\$2099.
VGA Color System	\$2199.



PRINTERS



NEW!
PANASONIC KXP-1180
9 Pin Dot Matrix
Printer **\$199.**

PANASONIC

1180 192/30	\$199.
1124 192/63 cps	339.
1524 240/90 cps	575.
1592 220/38cps	415.
1595 290/51cps	449.
KXP 4450 Laser w/Toner	1599.

EPSON

LX 800 180/32cps	\$199.
EX 800 300/60cps	439.
FX 650 264/54cps	389.
FX 1050 200/54cps	467.
LO 500 180/60cps	329.
LO 650 264/66cps	CALL.
LO 1050 264/66cps	CALL.
LO 2550 400/133cps	949.
DFX 5000 533/80cps	CALL.

NEC

P2200 170/55cps	\$369.
P5200 265/90 cps	530.
P5300 265/70 Wide	719.
P9XL 400/330 cps	1092.
LC890 Laser	3199.

OKIDATA

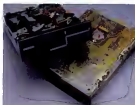
ML 182P 180/30	\$239.
ML 320 300/63	345.
ML 321 300/63	479.
ML 390 270/90	479.
ML 391 270/90	655.
ML 393 450/120	1065.
ML 393 COLOR	1079.

HEWLETT PACKARD

Deskjet	\$709.
Laser Jet II	1739.

DICONIX

150p 150/50	\$313.
300 WP 310/73	489.



MONITORS

MAGNAVOX 14"
Analog VGA
Monitor
\$379.



VGA Plus Card **\$579.**

MAGNAVOX

Amber TTL Mono	\$75.
14" VGA Mono/Flat (640x380)	149.
14" RGB TTL (640x240)	249.
14" EGA/CGA (720x350)	349.
14" VGA (800x600)	419.

MITSUBISHI

1409 13" CGA (640x200)	\$249.
1410 13" EGA (640x350)	361.
Diamond Scan (800x600)	490.

SONY

1302 13" Multiscan (1024x768)	\$644.
1303 13" Multiscan (800x600)	522.

ZENITH

1390 13" RGB (640x450)	\$439.
1490 14" FTM Monitor	648.

NEC

Multisync II 13" (800x600)	\$399.
Multisync XL 19" (1024x768)	2249.

VIDEO BOARDS

THE™ Mono/Color	\$59.
THE™ VGA/480	159.
THE™ VGA/256	229.
PARADISE Autowatch 480	215.
PARADISE VGA+	274.
VIDEO 7 VEGA VGA	285.
VIDEO 7 VEGA DELUXE	214.
ORCHID Pro Designer VGA	299.
ORCHID Designer VGA 800	235.
ATI EGA Wonder 800	230.



COMPUTER SYSTEMS

AST Premium 386 MDL 300	\$2779.
AST Premium 286 MDL 140	2649.
COMPAQ Design 286-40MB	CALL.
COMPAQ Design 386-25/110	CALL.
COMPAQ Design 386-20/60MB	CALL.
IBM MDL 30-21, 20MB	CALL.
IBM MDL 30-266, 30MB	CALL.
IBM MDL 502, 30MB	CALL.
VENDEX Headstart I/II	CALL.

LAPTOPS

NEW!
TOSHIBA
T-3100E
\$2799.



TOSHIBA

T-1000	\$779.
T-1200H/VB	2214/2399.
T-1600 NEW!	CALL.
T-3100E NEW!	2799.
T-3200	3599.
T-5100	4749.
T-6200 NEW!	CALL.



ZENITH
Supersport 286
with 20MB
\$3199.

Supersport MDL 2	CALL.
Supersport MDL 20	CALL.
Supersport 286 MDL 40	CALL.
Turboport 386	CALL.

PC NETWORK



*DEFECTIVE SOFTWARE REPLACED. DEFECTIVE HARDWARE REPLACED OR REPAIRED. PRICES SUBJECT TO CHANGE.

SELECTION PRICE



SOFTWARE

SPECIAL!
WordPerfect
5.0
\$225.



PLOTTERS/DIGITIZERS

HOUSTON DMP 41, 42, 52, 61
HOUSTON DMP 52MP, 62MP
ROLAND DXY 885 DXY980
CALCOMP 1023
SUMMASKETCH 12X12
SUMMASKETCH 12X18

DISK DRIVES

SEAGATE ST-225 20MB/KI
SEAGATE ST-251 40MB/KI
SEAGATE ST-251-1 40MB/28MS
SEAGATE ST-4096 80MB/28MS
MINISCRIBE 3650 40MB/KI
MINISCRIBE 3675 60MB HD/KI
MINISCRIBE 6065 71MB/22MS
PRIM ID230 230MB/RL/12MS
MITSUBISHI 360K 5.25"HH
MITSUBISHI 720K 3.5"HH
MITSUBISHI 1.2MB 5.25"HH
MITSUBISHI 1.44MB 3.5"HH
SYSGEN Bridge File 3.5" Ext. Drive

SCANNERS

H.P. Scanjet w/Interface
PANASONIC RS 505 Flatbed
PANASONIC RS 506 Flatbed
MICROTEK MSF 300G
MICROTEK MSF 300C Flatbed
PRINCETON LS 300 w/Adapter
COMPLETE PC Handsanner
LOGITECH Scanman

HARD CARDS

PLUS DEVELOP. Hard Card 20
PLUS DEVELOP. Hard Card 40
WESTERN DIGITAL File Card (30)...419.

MICE

LOGITECH

Hi Res (Bus)
Clear Mouse (Serial)
C-7 (Serial or Bus)
Mouse w/Paint (Bus or Serial)

MICROSOFT

MOUSE w/Windows & Paint
MOUSEw/Paint & Menu
MOUSE w/EasyCAD

MODEMS

THE™ 2400 Internal
THE™ 2400 External
THE™ 9600 Internal
THE™ 9600 External
HAYES Smartmodem 1200
HAYES Smartmodem 1200B
HAYES Smartmodem 2400
HAYES Smartmodem 2400B
US ROBOTICS HST 9600

CO-PROCESSORS/CHIPS

INTEL 8087-1
INTEL 8087-3
INTEL 80287-6
INTEL 80287-10
INTEL 80387-16
INTEL 80387-20
INTEL 80387-25
THE™ 640K Upgrade Kit
THE™ Memory Upgrades

MULTIFUNCTION CARDS

AST 6Pack w/384K
AST Rampage AT w/512K
AST Advantage Premium w/512K
INTEL Above Board + 286 w/512K
INTEL InBoard 386 PC w/1MB
ORCHID Twin Turbo
ORCHID Tiny Turbo
THE™ Multi I/O XT or AT

ACCESSORIES

THE™ 3.5"DS/DD Bulk 25
THE™ 5.25"DS/DD 50 Pack
THE™ 5.25"DS/HD Bulk 25
FUJI 3.5"DS/HD 10 Pack
FUJI 3.5"DS/HD 10 Pack
CH PRODUCTS Mach III Joystick
CH PRODUCTS Game Card 35
FTI DataShield S100
CURTIS Ruby Filter & Outlet

FAX

CANON Faxphone 8
CANON Faxphone 20
CANON Faxphone 25
SHARP FC220
SHARP FC300
SHARP FC420
MURATA M1200

JOIN PC NETWORK FOR SERVICE, SELECTION & PRICE.

- ☒ New "Net" Pricing... All Members Pay Prices Shown + Shipping.
- ☒ All Products on Display at Our Warehouse Showroom.
- ☒ No Credit Card Surcharge on Master Card or Visa.
- ☒ Free Technical Support Before and After the Sale.
- ☒ Fast 24-Hour Shipping on all In-Stock Items.
- ☒ Qualified Sales Representatives Standing by to Serve You.



PMC469

1-800-621-SAVE

- TECH SUPPORT 1-312-205-1410
- CUSTOMER SERVICE 1-312-205-1510
- FACSIMILE 1-312-205-1525

625 ACADEMY DRIVE, NORTHBROOK, IL 60062 HOURS: MONDAY-FRIDAY 8:30AM-6:00PM SATURDAY 10:00AM-4:00PM

CIRCLE 335 ON READER SERVICE CARD

Arlington Computer Products gives you the best prices on IBM PCs... and Compaq too!

IBM PERSONAL SYSTEM II

Model 30, 286, 20 MB, w/Monitor	\$2099
Model 50Z, 30 MB, w/Monitor	\$2949
Model 60, w/44 MB and Monitor	\$3495
Model 60, w/70 MB and Monitor	\$3895
Model 70, w/80 MB and Monitor	\$4395
Model 70, w/121 MB and Monitor	\$5749
Model 80, w/44 MB and Monitor	\$4595
Model 80, w/70 MB and Monitor	\$5195
w/Color Monitor add \$250	
IBM XT & AT Call for Custom Configurations	

COMPAQ 286

DESKTOP — (12 MHz)	
1 Drive 640K, 40 MB, Mono Monitor	\$2295
COMPAQ PORTABLES	
386 Model 40	\$5649
386 Model 100	\$6995
SLT 20	\$3949
SLT 40	\$4449
Portable III 20 MB	\$3599
w/40 MB	\$4175

COMPAQ 386

Model 386S w/40 MB (18 MHz)	\$3695
Model 386E MB (20 MHz)	\$3749
Model 386E w/40 MB (20 MHz)	\$4695
Model 386E w/110 MB (20 MHz)	\$5695
Model w/110 MB-25 MHz	\$7199
Model w/300 MB-25 MHz	\$9099

COMPAQ DESK PRO

1 Drive, 640K, 20 MB Green or Amber Monitor	\$1695
--	--------

AST PREMIUM

286 10 MHz, 512K, 1 floppy, 40 MB, serial and parallel ports, mono monitor.	\$1949
---	--------

386 C 20 MHz, 1 MG Memory Cache, 1.2 floppy, 40 MB (28Ms.), mono monitor.	\$3449
---	--------

PRINTERS

EPSON			
LX 800	\$169	LQ 500	\$275
DFX 5000	\$1349	LQ 850	\$515
FX 850	\$339	LQ 1050	\$715
FX 1050	\$429	LQ 950	\$579
EX 800	\$379	LQ 2550	\$909

OKIDATA			
ML 320	\$339	ML 321	\$489
ML 390	\$469	ML 391	\$639
393			

TOSHIBA			
321 S/L / 341 S/L	\$459/\$589		
351 SX	\$885		

NEC			
P5200	\$539	P5300	\$699
P2200	\$349	P9XL	\$1049

IBM			
Quietwriter III	\$1199		
Proprinter II	\$389		
Proprinter X24	\$549		
Proprinter XL III	\$599		
Proprinter XL24	\$719		

HEWLETT-PACKARD			
Laserjet II	\$1695		
Laserjet IID	\$3149		
1 MG Upgrade	\$309		
2 MG Upgrade	\$549		
4 MG Upgrade	\$1199		
25 in 1 Font	\$265		

MULTIFUNCTION BOARDS

DFI w/384K	\$189
AST 6 Pack w/384K	\$219
AST Rampage AT w/512K	\$389
AST Hot Shot	\$355
Everax PSII w/2 MG	\$795
Orchid Tiny Turbo	\$269
Intel Above Board 286+	\$399
Irma Board	\$695
AST 5251-11	\$529
AST 5251-11 Plus Enhanced	\$589

CHIPS

64K Ram Chips	9 for \$25
256K Chips	each \$10
Compaq 386 1 MB	\$549
Compaq 386 4 MB	\$1795
8087-3/-2	\$109/\$149
80287-8MHz	\$159
80287-8MHz	\$219
80287-10MHz	\$259
80387-16	\$359
80387-20	\$449
80387-25	\$599

SOFTWARE

D Base III Plus	\$399
D Base IV	\$459
Framework	\$399
IBM Displaywrite IV	\$289
Logitech Mouse	\$74
Lotus 123	\$299
Managing Your Money	\$125
Microsoft Mouse	\$99
Microsoft Word	\$219
Mouse Systems Mouse	\$89
Multimate Adv. II	\$259
R Base for DOS	\$439
Symphony	\$429
Ventura Desktop Publ.	\$469
Word Perfect 5.0	\$219

MODEMS & FAXES

Hayes 1200/2400	\$289/\$419
Everex 1200/2400	\$79/\$149
Everax 2400 External	\$199
US Robotics 2400 Int.	\$169
Sharp FO-300 Fax	\$1149
Sharp FO-420 Fax	\$1299

DRIVES & TAPES

Ext. 5 1/4" for PSII	\$219	SEAGATE HARD DISKS	
Ext. 1.2 for PSII	\$219	20 MB for XT (ST225)	\$269
Toshiba 3 1/2" 720K	\$99	30 MB for XT (ST238)	\$289
Tohiba 3 1/2" 1.44	\$105	40 MB for AT (ST251)	\$349
20 MB Tape	\$339	40 MB for AT (ST251-1)	\$419
40 MB Tape	\$459	80 MB for AT	\$589

IOEGA

Bernoulli Box II 5 1/4" 20 MB Int. w/cerd	\$969
Dual 20 Ext. w/card	\$1769
Bernoulli Plus	\$3450

PLUS

Hard Card 20 MB	\$529	Hard Card 40 MB	\$649
-----------------------	-------	-----------------------	-------

VIDEO BOARDS

ATI EGA Wonder 800	\$259
ATI VIP VGA	\$269
Compaq VGA	\$449
Evarex EGA Autoewitch	\$159
Everex VGA	\$239
Hercules Graphics Plus	\$179
NEC MVA 1024	\$799
Orchid VGA	\$289
Paradise Autoswitch 480	\$189
Paradise VGA	\$269
Paradise Professional	\$469
Vega VRAM VGA	\$499
Vega VGA	\$269

MONITORS

NEC	
Multisync	\$579
Multisync Plus	\$889
Multisync XL 19"	\$2149
MITSUBISHI	
EGA	\$399
Diamond Scan	\$499
PRINCE	
HX12E	\$449
Ultresync	\$499
SAMSUNG	
Color/EGA	\$229/\$339
Multisync	\$439

**Arlington
Computer
Products, inc.**

3025-E S. MALMO
ARLINGTON HEIGHTS, IL 60005

FOR ORDERS & SYSTEMS QUOTES:

800-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 312-228-6333

SHIPPING 312-228-6333

TECHNICAL ASSISTANCE 312-228-1470

FAX 312-228-0516

Prices and Availability Subject To Change Without Notice

America's choice and Arlington Computer Products choice is EPSON®

It's not hard to understand why. Care in design, engineering and manufacturing have made Epson an industry leader and the industry standard. And to back their reputation, a one year warranty stands behind every Epson product.

Arlington Computer Products is an authorized Epson® dealer. Please call for immediate delivery at very competitive prices.



Epson FX-850

- Narrow-carriage 9-pin, dot-matrix printer
- SmartPark™, a unique Epson paper-handling innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware or paper
- With a standard push feed tractor and single sheet friction feed, the FX-850 can handle virtually any type of paper as well as envelopes
- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips
- The FX-850 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI), 54 CPS in Near Letter Quality mode (12 CPI)



Epson FX-1050

- Wide-carriage 9-pin, dot-matrix printer
- SmartPark™, a unique Epson paper-handling innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware or paper
- With a standard push feed tractor and single sheet friction feed, the FX-1050 can handle virtually any type of paper as well as envelopes
- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips
- The FX-1050 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI), 54 CPS in Near Letter Quality mode (12 CPI)



Epson LQ-500

- Epson's 24-pin, dot-matrix technology creates true letter quality characters and high-resolution graphics
- Prints 180 characters per second (CPS) in draft mode, 60 CPS in letter quality (12 CPI)
- Automatic single sheet loading, standard pull tractor and friction feed for versatile paper handling
- Exclusive SelectType front control panel offers quick, easy selection of popular typescripts, fonts and pitch
- Two resident, letter quality fonts — Roman and Sans Serif
- New "shadow" and "outline" print modes for use with desktop publishing applications



Epson LQ-850

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- Exclusive SelectType front control panel offers quick, easy selection of popular typescripts, fonts and pitch
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or Letter Quality mode, the LQ-850 runs at a surprisingly quiet 55 dB noise level



Epson LQ-1050

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or letter quality mode, the LQ-1050 runs at a surprisingly quiet 55 dB noise level
- Exclusive SelectType front control panel offers quick, easy selection of popular typescripts, fonts and pitch



Epson LQ-2550

- 24-Pin technology creates superior Letter Quality characters and high-resolution graphics up to 360 dpi.

- 7-Color printing capability is standard.
- Epson's SmartPark™
- Exclusive LCD SelectType front control panel for easy selection of pre-sets, fonts and printer functions.
- 133 Characters per second print speed in Letter Quality mode (12 CPI)
- 400 Characters per second print speed in draft mode (12 CPI)
- Epson LQ ESC/P™ assures software compatibility.

EPSON®

**WHEN YOU'VE GOT AN EPSON,
YOU'VE GOT A LOT OF COMPANY.™**

CIRCLE 336 ON READER SERVICE CARD

Epson is a registered trademark of Seiko

**Arlington
Computer
Products, inc.**

3025-E S. MALMO
ARLINGTON HEIGHTS, IL 60005



Call: **800-548-5105**

In Illinois 1-312-228-6333

Fax: 312-228-0516

LepreCard Disk Cards for PC & AT Computers

Shamrock's LepreCards feature the latest low power, high reliability disk drives and controllers. You can use them as the first or second hard disk in your system. Low power consumption means less strain on your system. You get a 1 year warranty, unlimited technical support, & our illustrated installation and user's guide. Models available for IBM PC/XT and compatibles, AT's and compatibles, as well as the TANDY 1000/A/SX/TL/SL.

FREE SOFTWARE including **TakeTwo**, the backup utility PC MAGAZINE named Editors choice in 1986 & 1987, & LepreCache disk caching from Multisoft.

CAPACITY	20MB	32MB	49MB	65MB
AVG. ACCESS	40ms	40ms	28ms*	16ms*
8 Bit PC/XT	\$299	\$319	\$549	\$649
16 Bit PC/AT	N/A	\$379	\$599	\$679

*Average access speed per partition. Tandy 1000/A/SX/TL/SL LepreCard add \$20.

TakeTwo



Tandy 1000 Model

Seagate PC/XT Disk Kits

- Pretested & formatted
- Western Digital short slot controller
- 30 page installation guide & reference manual
- Cables, mounting screws, full & half-height face plates
- FREE! TakeTwo high speed backup software, PC MAGAZINE "Editors Choice"
- FREE! LepreCache software by Multisoft
- 1 year Warranty, 30 Day Money Back Guarantee
- Optional: 150 Watt, UL/FCC approved power supply for IBM PC's \$69



Tandy 1000 kits add \$20

30MB KIT \$299

- Seagate ST238 - 32.7MB/65ms/half-height/14.8 watts

65MB KIT \$499

- Seagate ST277R - 65.5MB/26ms/half-height/11 watts

Seagate

Matched Pair Kits

- Seagate Drive & Matched Controller
- 1 year factory warranty
- 15% faster throughput than ST251 drive

20MB \$249
40MB \$349

NEW

NEW

LepreKeys

\$99

- 111 Key enhanced layout
- Built-in Solar Powered Calculator
- Switchable Ctrl, Capslock keys
- Double injection molded key caps
- Removable function key template
- ALPS tactile keyswitches as used by Northgate
- 100% PC/XT/AT/386 & Novell network compatible



286/386 Computers



SHAMROCK Computers give you the maximum in performance and value.

Our data crushing systems come standard with high performance SCSI disk interfaces. This gives you the data transfer capabilities required by this high performance generation of systems. All our computers have 8 slot motherboards, room for 1 full and 3 half-height drives, serial/printer ports, AWARD BIOS, clock/calendar, choice of 1.2 MB or 1.44 MB floppy drive, and LepreKeys Enhanced Keyboard with tactile switches and built-in solar calculator. Our 286 systems feature 12 & 16 MHz processors and 512K RAM standard, upgradable to 4 MB on system board. Our 386 systems offer 16 & 20 MHz processors and 1 MB RAM standard, upgradable to 8 MB. A 64K static column RAM cache operating at 35 nanoseconds insure maximum processor performance.

And don't forget that when you buy from Shamrock you get a 1 year warranty and 30 day money back guarantee.

SYSTEM	286 COMPUTERS	NORTON MIPS	PRICE
	SI V4.0		
IBM Model 50Z	11.2	1.6	\$2,995
Shamrock 286-12/1 wait	11.8	1.9	\$ 799
Shamrock 286-12/0 wait	15.3	2.5	\$ 888
Shamrock 286-16/1 wait	15.9	2.6	\$ 899

SYSTEM	386 COMPUTERS	NORTON MIPS	PRICE
	SI V4.0		
Compaq 386-16	15.6	2.8	\$3,995
Shamrock 386-16/0 wait	18.7	2.8	\$1,799
Shamrock 386-20/0 wait	24.4	4.3	\$1,999

AT Disks

- Seagate Drive with IBM AT rails & cables
- FREE! OnTrack large drive software
- FREE! LepreCache & TakeTwo backup software
- Formatted, Partitioned & Tested

Size	Model	Speed	Format	Capacity	Price
HH	ST251	40ms	MFM	48MB	\$359
HH	ST251-1	30ms	MFM	42MB	\$449
HH	ST277R	40ms	RLL	65MB	\$449
PH	ST4096	28ms	MFM	80MB	\$599

Shamrock

733-AA Lakeside Rd. Dept. P.
Westlake Village, CA 91361

to order or get our free catalog, call

TOLL FREE
800-722-AT-XT
California
(805) 373-7847
FAX
(805) 379-9345



- No extra for Visa/Master/Discover (AMEX add 3%)
- Prices include UPS surface shipping
- Federal Express shipping just \$1.50 per pound
- 30 Day money back guarantee
- Corporate & Institutional P.O.'s accepted
- Call for our FREE CATALOG.

EPSON® Rebate ALERT!

Through April 30 Only!

...Business to Business Can Deliver EPSON Printers Faster and More Cost Effectively.

Only Business to Business Offers the Exclusive One Year Replacement Warranty...

FACTORY REBATES ON ALL EPSON LQ PRINTERS

Epson	Rebate
LQ-500	\$25
LQ-850	\$50
LQ-950	\$75
LQ-1050	\$100

Rebates good from Feb. 10th through Apr. 30th, 1989.

Business to Business provides: dated-invoice, rebate form, serial number sticker - Everything you need to get your rebate FAST.

All you do is mail it in!



\$262
(after rebate)

LQ-500

- Creates high-resolution text and graphics
- 180 CPS draft mode; 60 CPS Letter Quality
- Selectype front control panel
- Epson's one year limited warranty

EPSON PRINTER SPECS

EPSON	Width	Speed	Price
LX-800	STD.	180/30 NLQ	\$177
LQ-500	STD.	180/60 LQ	\$262*
FX-850	STD.	264/54 NLQ	CALL
FX-1050	WIDE	264/54 NLQ	CALL
LQ-850	STD.	264/88 LQ	\$50 rebate
LQ-950	MEDIUM	264/88 LQ	\$75 rebate
LQ-1050	WIDE	264/88 LQ	\$100 rebate
LQ-2550	WIDE	400/133 LQ	CALL

*Price after factory rebate

Authorized Epson Customer Care Center

Panasonic

KX-P1124



24 Pin Dot Matrix Printer

Panasonic	Width	Speed	Price
KX-P1180	MEDIUM	192/38 NLQ	\$187
KX-P1191	MEDIUM	240/48 NLQ	CALL
KX-P1124	MEDIUM	192/63 LQ	CALL
KX-P1524	WIDE	240/80 LQ	CALL

BUSINESS TO BUSINESS™

One Year Free Replacement Warranty

We guarantee every product we sell to be free of defects as covered in the manufacturer's warranty, or we will replace it with a brand new one FREE for one full year. You only pay shipping and insurance.

"The response to our new one year free replacement warranty has been tremendous. For the first time a direct marketing company has addressed the major concern of direct buyers.

"What do I do when I have a problem?"

Now Business To Business has answered that question decisively. If a problem occurs with any product you purchase from us anytime during the first year and it's covered by the manufacturer's warranty, simply ship it back to us and we'll immediately ship you back a brand new one FREE."

Jeffrey M. Krepis
President

Why We're The BEST Direct Marketer in the U.S.

- ☒ Exclusive ONE YEAR Replacement Warranty
- ☒ 30 Day Return Privilege
- ☒ No Extra Charge for Credit Card
- ☒ Same Day or Next Day Shipping
- ☒ No Charging Credit Card Until Product Ships
- ☒ Factory Authorized Service Center
- ☒ Highest % of Products in Stock
- ☒ Customer Always told Stock Status before Ordering
- ☒ Knowledgeable Sales and Technical Staff

BUSINESS TO BUSINESS™

Formerly PC Pitstop

4110 W. Lake St., Minneapolis, Minnesota 55416

800-852-2888

Hours: 8-4 CST Mon-Fri 24 Hour Fax Hotline: 612-920-3390

CIRCLE 355 ON READER SERVICE CARD

USA★FLEX Has Quality, Name-Brand Products at UNBEATABLE PRICES!!!

The Ultimate 286-1MEG

The Last Computer System You'll Ever Need!!!

WESTERN DIGITAL

- 2 serial ports
- 1 parallel port
- 1:1 hard disk controller w/diskcache
- Mouse port
- 101 keyclick keyboard
- 1.2 MEG floppy drive
- 12.5 MHz-faster than the competitor
- 16-bit EGA; operates at 12.5 MHz
- 3 expansion slots
- 180 WATT power supply



WESTERN DIGITAL

12" Monochrome Monitor
System \$1299

14" CGA Color Monitor
System \$1449

14" EGA Color Monitor
System \$1549

TOSHIBA

LAPTOP COMPUTERS

T1000 4.77MHz, 80C88 CPU	\$749
T1200 4.77/9.4MHz, 80C86 CPU ..	\$2198
T1600 12MHz, 80C86 CPU	CALL
T3100e 12MHz, 80286 CPU	\$2696
T3200 6/12MHz, 80286 CPU	\$3698
T5100 8/16MHz, 80386 CPU	\$4594
T5200 20MHz, 80386 CPU	CALL

EPSON PRINTERS

LX-800	\$176
LQ-500	\$261
FX-850	\$338
LQ-850	\$468
EX-800	\$399
LQ-1050	\$618
FX-1050	\$449
LQ950	\$514
LQ-2550	\$918
DFX-5000	CALL
Hewlett-Packard Brand	
Toner Cartridges	\$86
Hewlett-Packard Inkjet Cartridges	
for Deskjet Printer	\$16.95
Laser Printer	CALL

COLORADO MEMORY SYSTEMS INC.



40 MB Tape Backup System

Internal System	\$299
External System	\$399
*Requires DC2000 Data Cartridges-	
Sony DC2000 Data Cart.	\$17.49

UNISON 600

600 WATT UNINTERRUPTABLE POWER SUPPLY

*600 WATT continuous power supply •
Remote-on capability • Phone surge sup-
pressor • Recessed light bar • Total power
available 1400VA

\$499

MODEMS

With Communication Software

"deskalk" 2400 BPS Internal	
D1-24DTM	\$99
"deskalk" 2400 BPS External	
D1-FTM	\$119

FAX MACHINES

SHARP FO220	\$949
SHARP FO420	\$1298
MURATA M-1200	\$674
MURATA M-1600	\$828

MONITORS

Magnavox 13" Mono White VGA	
7BM749	\$125
Magnavox 13" RGB 8CM873	\$235
Magnavox 13" EGA CM9043	\$339
Magnavox 13" VGA 8CM062	\$369
Magnavox 13" Mac II Color	
9CM080	\$475
NEC 14" MultiSync 2A D1-NEC2A	\$499
NEC 14" MultiSync GS D1-NEC6S	\$239
NEC 14" MultiSync 3D D1-NEC3D	\$649
Zenith 14" Flat Tension VGA	
1490	\$598
Save \$20 on any Monitor and Paradise Video Card Combination!!	

Panasonic PRINTERS

KX-P1190I	\$185
KX-P1124	\$307
KX-P1524	\$555
KX-P4450	\$1479



PARADISE VIDEO CARDS

Mono/Color D1-PBV	\$99
Basic EGA D1-PBEGA	\$169
Auto Mono EGA D1-PMEGA	\$182
Auto 480 EGA D1-PAS480	\$199
VGA Plus D1-PVGAPLUS	\$259
VGA Plus 16 D1-PVGAP16	\$309
VGA Professional D1-VGAPRO	\$493

USA★FLEX

135 N. Brandon Drive, Glendale Heights, IL 60139

All prices and specifications are subject
to change without notice.

EPSON®WHEN YOU'VE GOT AN EPSON,
YOU'VE GOT A LOT OF COMPANY.™

EPSON PRINTER BLOWOUT!



LQ-950

- Mid-size carriage, 24-pin printhead
- 110 columns
- 264 CPS-draft, 88 CPS-LQ
- 360 x 360 dpi graphic resolution



LQ-2550

- Wide carriage, 24-pin impact dot matrix printer
- 136 columns
- 333 CPS-draft, 111 CPS-LQ
- Built-in 7 color printing
- Bi-directional logic seeking printing



DFX-5000

- Wide carriage, 9-pin printhead
- 533 CPS-SuperDraft high speed utility, 480 CPS-draft, 80 CPS-NLQ
- Supported by third party coax and twinax interface boards

**Rebates from
\$25 to \$100
(On Selected Printers)
from EPSON**

LQ-850

- 24-pin dot matrix printer
- 80 columns
- 264 CPS-draft, 88 CPS-LQ

FX-850

- Narrow carriage, 9-pin dot matrix printer
- 264 CPS-high speed draft
- 54 CPS-NLQ
- SmartPark paper-handling

LX-800

- 9-pin printhead
- 80 columns
- 180 CPS-draft, 32 CPS-NLQ
- Parallel interface

EX-800

- 9-pin printhead
- 80 columns
- 300 CPS-draft, 60 CPS-NLQ
- Parallel and serial interface

FX-1050

- Wide carriage 9-pin, dot matrix printer
- 264 CPS-high speed draft
- 54 CPS-NLQ
- SmartPark paper-handling

LQ-1050

- 24-pin printhead
- 136 column
- 264 CPS-draft, 88 CPS-LQ

LQ-500

- 24-pin dot matrix printer
- 80 column
- 180 CPS-draft, 60 CPS-LQ

OUR PRICES ARE SO LOW WE CAN'T PRINT THEM!!

* CALL TOLL FREE 7 TO 7 MONDAY THRU FRIDAY — 9 TO 2 SATURDAY *

800-872-3539

FAX# 312-351-7204

Customer Service and Technical Support Number 312-351-7172

ORDERING INFORMATION: MINIMUM ORDER \$100. Shipping and handling additional. MasterCard, Visa and prepaid orders accepted. No surcharge for MasterCard or Visa. C.O.D. orders under \$500 add \$5.00 special handling charge. C.O.D. orders over \$500 add \$10.00 special handling charge. We ship to the 50 states, APO, FPO, AK and HI orders add an additional 5% to the total order to cover PAL and insurance. All returns must have prior authorization from our Customer Service Department (312-351-7172). Unauthorized returns and refused shipment subject to a 20% restocking fee. All prices and specifications are subject to change without notice.

CIRCLE 105 ON READER SERVICE CARD

HOURS:

7 AM to 7 PM Monday-Friday
8 AM to 2 PM Saturday
Call on Sunday

P.O. BOX 3185 • OAK BROOK, IL 60522-3185

Systems

Visa, MasterCard, Discover
and American Express
Accepted.



IBM-NOVELL Network Support \$85/Hour 1-800-634-8215

COMPAQ
Laptop SLT 286
20/40 Mb
\$3800/\$4200

COMPAQ
AGCM
Monitor
\$1399

TOSHIBA
T3200/40
Laptop
\$3500

**1% Consultant
and Reseller
Accrual Program**
(\$52,485 paid in 1988)

IBM PS/2

Model 25-C	\$1250
Model 30-285 20 Mb Disk	\$1810
Model 30-20 Mb Disk	\$1565
Model 30-20 Mb Disk	\$2390
Model 50-30 Mb Disk	\$2700
Model 50-60 Mb Disk	\$3120
Model 60-44 Mb Disk	\$3200
Model 70-60 Mb Disk	\$3400
Model 70-120 Mb Disk	\$3500
Model 70-A21-120 Mb Disk	\$7800
Model 80-44 Mb Disk	\$4250
Model 80-70 Mb Disk	\$4600
Model 80-115 Mb Disk	\$5000
Model 80-314 Mb Disk	\$6200

COMPAQ

286 Mod 1/640 K	\$1870
286 Mod 1/400 K-Monitor	\$2200
386 Desiro/20 130 Mb	\$6450
386 Desiro/20 300 Mb	\$6800
386 Desiro/20 40 Mb/110 Mb	\$4475/\$4500
386S Desiro Mod 1	\$2500
386S Desiro 20Mb/40Mb	\$6800
386S 21/100/300Mb	\$7900
Portable II Model 4	\$3400
Portable II Model 20	\$3400
Portable II Model 40	\$4250
Portable 388 Model 40	\$5400
Portable 388 Model 100	\$6800
Laptop SLT 286 20/40	\$3800/\$4200

TOSHIBA LAPTOPS

T1000	\$775
T1200B	\$1585
T1200HB	\$2290
T1600	\$3250
T2000/200	\$2800
T3200	\$3500
T5100	\$4100
T5200 40 Mb/100 Mb	\$5600/\$6900

ZENITH LAPTOPS

289/20 Super Sport	\$3300
386/40 Turbo Sport	\$5400

PACKARD-BELL

386 System	\$2900
286 System	\$1700
6086 System	\$795

DISK DRIVES

SEAGATE 20 Mb KR	\$259
SEAGATE 30 Mb KR	\$259
SEAGATE 40 Mb KR XT...	\$365
SEAGATE 40 Mb ST 251-1	\$439
SEAGATE 80 Mb	\$639
TOSHIBA 1.44 Mb Floppy	\$129
PROCOM Ext S 25" for PS/2	\$290
COMPAQ 1.44 1/2 HD	\$195

Hardcards	
MINISCRIBE 20 Mb	\$379
PLUS 20 Mb/40 Mb Hard Card	\$535/\$47
PRISM 30 Mb/40 Mb	\$425/\$132
PROCOM 40 Mb for PS/2	\$795
MAYNARD 20 Mb	\$301

FAX

CANON FAX 8	\$600
CANON FAX 20	\$1050
CANON FAX 25	\$1725
MURATA M1200	\$241
MURATA M1200	\$699
SHARP F2022/F2030	\$950/\$1
SHARP F2020/F2030	\$1300/\$400
TOSHIBA 300	\$1275
TOSHIBA 1200	\$1049
TOSHIBA T3300	\$1159
TOSHIBA T3700	\$1500
6 FAX ROLLS	\$40

COPIERS

CANON PC3	\$399
CANON PC0RE	\$1000
CANON PC7	\$1100
Toners	\$70-120

TAPE

IBM 5157 for PS/2	\$1350
IRWIN 40 Mb IntExt	\$405
MAYNARD 60 Mb XT/AT IntExt	\$675/\$81
MAYNARD 60 Mb for PS/2	\$899
MOUNTAIN 60 Mb	\$1199

MONOCHROME MONITORS

AMDEK 210/410	\$79/145
COMPAQ Mono Amber/Green	\$210
COMPAQ VGA Mono	\$210
IBM PS/2 6502	\$200
MULTISYNC GS	\$195
PACKARD-BELL Amber/Green	\$85

COLOR/EGA MONITORS

ANDEK 6500/C22	\$344/435
IBM PS/2 8512	\$435
PGS UltraSync	\$500
SAMSUNG RGB	\$245
ZENITH 1390	\$405

VGA/CAD MONITORS

COMPAQ AGCM Monitor	\$1399
COMPAQ VGA Color	\$520
CSA 1016	\$1779
HITACHI 4119	\$2295
IBM PS/2 8513	\$515
IBM PS/2 8514	\$1075
MITSUBISHI 6905/6922	\$2300/\$1934
NEC MultiSync XL	\$2070
NEC MultiSync 2L	\$879
NEC MultiSync 2	\$775
ZENITH 1490	\$619

NETWORK

NOVELL	
SANTA CLARA Diskless Workstation	\$631
WESTERN DIGITAL 3 Node LAN kit	\$700
Western Digital Software	\$470
Entry-level 286 Starter Kit, 4 Users	\$470
NOVELL 286 Software w/Keyboard	\$1500
NOVELL 286 Software V.212	\$1939
NOVELL ST7 Network Level 1	\$2120
NOVELL ST7 Software	\$2740
Level II V.21	\$2740
Non-dedicated Network Software 286	\$1470

INTERFACE CARDS

ARCNET PC110 LANBOARD PS2	\$520
ARCNET PC110 LANBOARD	\$185
ARCNET PC210 LANBOARD	\$235
ETHERNET Interface Controller	\$225
ETHERNET Plus Board (for 286)	\$950
G-NET Interface Card w/cable	\$294
WESTERN DIGITAL	
Ethernet Cards	\$260

ACCESSORIES

ARCNET Passive Hub	\$80
--------------------	------

ARCNET Active Hub

Ethernet Terminators	\$38
----------------------	------

Novell trained & authorized sales & support.

IBM Adapter Card	\$450
IBM Disk Expander	\$425
PC Lan Program	\$150

TERMINALS

WYSE 50 Amber or Green	\$370
WYSE 66 Amber or Green	\$255
WYSE 85	\$384

SOFTWARE

Adios PageMaker	\$459
Auto Cad 10.0	\$2200
COMPAQ DOS 3.31	\$89
Dbase III	\$405
DisplayWrite IV	\$285
IBM DOS 3.34/01	\$90/110
IBM DOS/2 Standard 1.1	\$235
IBM DOS/2 Extended 1.1	\$530
Lotus 1-2-3 v.2 01 SW/2/5 *	\$290/299
Lotus Symphony	\$420
Multimedia Advantage 2	\$259
Notion Advanced Utilities	\$475
Paradox 2.0	\$180
Smartcom VIII	\$90/150
Ventura Publishing	\$420
Word Perfect 5.0	\$225

LASER PRINTERS

HP DeskJet	\$555
HP LaserJet IIiQ with toner	\$1875/2975
HP ScanJet	\$1075
NEC LC390	\$3244
PANASONIC KX4450	\$1590
TOSHIBA PageWriter	\$2499

PRINTERS

Epson	
FX 850 260/84 cps	\$345 *
FX 1050 260/84 cps	\$510 *
EX 800 300/60 cps	\$459
LD 600 264/86 cps	\$510 *
LD 1050 264/86 cps	\$745
LD 950	\$241
LD 950	\$929 *
DPX 5000	\$1399
Okidata	
320/21	\$365/477

Panasonic

KX 1180 1180/38 cps	\$185
KX 1181 1240/48 cps	\$249
KX 1082 1240/48 cps	\$320
KX 1174 1521/48 cps	\$319
KX 1592 180/38 cps	\$379
KX 1595 240/51 cps	\$445
KX 1524 240/80 cps	\$540
KX 3131 17 cps LQ	\$290
KX 3151 22 cps LQ	\$461

NEC

P2200 170/55 24 Wire	\$339
P2200 55 cps	\$1125
PS200	\$505
PS300	\$707
PSXL 290/100 cps	\$629
PSXL 400/140 cps	\$1095
Color Option	\$118

IBM

Quickwriter	\$241
Quickwriter II	\$1125
Prismwriter III	\$485
Prismwriter XL 24	\$645
Prismwriter III XL	\$645

COMMUNICATION/EMULATION

IBM PS/2 50-80 5250 Emulation	\$675
IBM PC XT/AT 5250 Emulation	\$700
AST PC XT/AT 5250 Emulation	\$575
IBM PC XT/AT 5270 Emulation	\$450
IBM PC XT/AT 3270/8 Emulation	\$400
IRMA Board	\$241
US ROBOTICS 1200 Ext	\$190
US ROBOTICS 2400 Ext	\$159
HAYES 1200 Ext	\$249/282
HAYES 1200 Ext	\$277
HAYES 2400 Ext	\$419
HAYES 2400 w/SCI Int.	\$418
EVEREX	\$75
EVEREX 2400 IntExt	\$137/195
VENTEL 1200/1200+	\$180/228
VENTEL 2400/2400 Ext	\$260/380

MULTIFUNCTION CARDS

EVEREX MagicCard OK	\$100
AST 6 Pack w/384K	\$241
AST Advantage/2 for PS/2	\$241
COMPAQ 1Mb Memory 386/20 & 20E	\$650
COMPAQ 4Mb Memory 386/20 & 20E	\$2200
COMPAQ 1Mb Memory 386/5/Portable	\$635

VIDEO BOARDS

COMPAQ AG 1024 Board	\$1049
COMPAQ AG Memory Board	\$475
COMPAQ VGA	\$145
COMPAQ VGA	\$419
GENDA Super Hi Res 800/800	\$175
GENDA Super VGA	\$175
PARADISE Auto Switch-480	\$155
PARADISE VGA	\$275
RP MegaGraphics	\$69
VEGA Deluxe	\$249
VEGA VGA	\$275

CHIPS

Intel	
8087-1/2/3	\$220/48/109
80287-4/6/10-A	\$187/220/259/355
80387-16/20/25/5X	\$450/565/720/440

ACCESSORIES

AB Switchbox	\$40
Keytronics 101 Keyboard	\$100
Printer Cable 6'116/20'	\$20/25/60
8 Outlet Surge Protector	\$25

MICE

LOGITECH Hires	\$95
LOGITECH PS/2	\$69
LOGITECH C7 Serial	\$69
LOGITECH Bus	\$74
DEKKA Mouse	\$69
Microsoft Mouse	\$119
IBM Mouse	\$75

"We Will Beat Any Price." Dick

1-800-634-8215

In Illinois Call

1-312-654-4100

SALES AND QUOTES (Outside Illinois) 1-800-634-8215

SHIPPING AND TECHNICAL SERVICE: 1-312-654-4170

QUOTE-A-FAX: 1-312-325-4999

- Corporate and volume purchases invited. Call Dick.
- Lease available.
- 24 hour turn in on all CPUs.
- Stock orders placed by 3:00 CDT shipped same day.
- 100% financing available.
- Credit card and COD purchases subject to verification.
- International orders welcome.
- Prices subject to availability and change without notice.
- Prices reflect 3% cash discount.
- Allow 10 days for personal checks to clear.
- Wire transfer accepted.
- Minimum \$5.00 shipping/handling charge.
- Restocking charge on returns.
- Prepay and take 1% discount.
- Educational P.O.s welcome.
- Fraud aggressively prosecuted.

* System prices

DON'T SETTLE FOR LESS...

NEW! 1124
Office Automation



- 24 pin, 192 cps draft, 63 cps LO
- 5 built in fonts
- front, bottom or rear paper feed
- paper parking and memo load
- Epson® LO-2500 and IBM® Proprinter™ X 24 emulations
- 2 year warranty \$CALL

Also... New 1180 & 1191 \$CALL

WordPerfect
Version 5.0 \$219

Microsoft Excel
..... \$219



HARDWARE

PC ADD ON BOARDS

BOCA RESEARCH	
RAM Card XT or AT	\$CALL
IO Card XT or AT	\$79
INTEL	
Aboveboard Plus	\$CALL
Aboveboard Plus I/O	\$CALL
Inboard 386	\$799
Call for Daughterboard Pricing	

intel CHIPS

8087	\$69
8087-1	\$189
8087-2	\$129
8087-5	\$159
8087-10	\$229
8087-16	\$369
8087-20	\$419

MICRON
RAM Card (MB-25 CH) populated w/ 2MB RAM \$729

TOPS	
TOPS/DO5 2.1	
new Net BIOS compatible	\$109
Flashcard	\$149
Net Print	\$109
TOPS/Mac	\$125

TOSHIBA LAPTOPS

T1000	\$779
T1200 (19MHz)	\$1369
T3200 (12MHz/40MB)	\$3999
Call for other Toshiba models	

Tax View \$67
11 taxa forms
Windows based
Save \$5.00 on any Mouse when purchased with Tax View

ACCESSORIES

CURTIS	
Ruby/Ruby +	\$55-\$85
Diamond Diamond +	\$30-\$35
Safe Strip	\$17
Switch Box	\$30
Curtis Clip CCI	\$4
SWAN	
Surge Suppressor	\$14
5'10" Printer Cable	\$10/\$14
6' Rt. Angle Printer Cable	\$12

Swan Technologies
Swan Modems
w/PC Talk III software

- H Hayes® compatible
- Auto answer/idle
- Time and pulse

2400 baud internal	\$129
1200 baud internal	\$69
2400 baud external	\$149
1200 baud external	\$99



Panasonic
Office Automation



LASER PARTNER

- 11 Pages per minute
- 300 Dots per inch
- 5 Letter emulation modes
- Serial & parallel interfaces
- Two 250 sheet cassettes

WAS \$1429 **\$1375**

Swan Technologies
\$249

VGA VIDEO CARD


- 256K Video Ram
- Enhanced VGA Modes
- Compatible w/All 17 VGA Monitors

Swan VGA card & Intel VGA monitor \$569

Swan VGA card & Intel Multiscan monitor (800 x 600 Res.) \$599



LOGITECH
HiREZ MOUSE



- Uses 62% less desk space
- Ideal for EGA & VGA
- Lightweight

Design with Tactile Feedback


\$89

BUS MOUSE SERIAL MOUSE
\$69 \$69

SCAN MAN

- Hand Held Scanner
- at Scanning Windows
- Great for Parts & OTP Programs

\$199



MAGNAVOX
Smart Very smart.

9082 VGA
14" COLOR MONITOR



- 17 VGA Modes
- Tilt/Swivel Base
- Analog Input Allows Virtually Unlimited Number of Colors

\$429


FLOPPY DISK DRIVES

SONY

3 1/2" (720K)	\$99
3 1/2" (1.44MB)	\$119

ROCTEC 6.25"

QTY.	360K	1.2MB
1-3	\$74	\$69
4-9	\$52	\$73
10+	Call for Quote	



PC HARD DRIVES

KLONK

KL320 20MB (40 ms) Bare/Kit	\$219/\$259
KL330 32MB (40 ms) Bare/Kit	\$249/\$299


MiniScribe

8438 30MB (68 ms)	\$299
3650 40MB (61 ms)	\$299
3053 40MB (25 ms)	\$449

Seagate

ST-225 20MB (65 ms) Bare/Kit	\$219/\$259
ST-238 30MB (65 ms) Bare/Kit	\$249/\$299
ST-125 20MB (40 ms) Bare/Kit	\$249/\$299
ST-151 40MB (40 ms)	\$439
ST-251-0 40MB (40 ms)	\$349
ST-251-1 40MB (24 ms)	\$439
ST-4096 80MB (26 ms)	\$599

Kits include cables, controller and mounting screws.



To order: No surcharge on Discover, Visa, MasterCard or AMEX
 ■ Your credit card is not charged until your order is shipped ■ COD orders accepted with no COD fee ■ We insure your order at no extra cost to you ■ Shipping: 3% or \$5 minimum for UPS Ground. Call for shipping charges on Express Air, APO, FPO, AK, HI and all foreign orders ■ Mail Orders: We accept money orders, certified checks, and personal checks. Allow 2 weeks for personal and company checks to clear ■ Defective items replaced or repaired at our discretion. PA deliveries add 8% sales tax. Prices and terms subject to change without notice ■ We accept purchase orders from qualified Educational and Corporate institutions. **MMG**



DISK-KOUNTS

DISKS

per box of 10	3.5"	5.25"
ROWER 05-00	\$19.95	\$9.95
MAUREL 05-00	\$19.95	\$9.95
VENATEL 05-00	\$19.95	\$9.95
SONY 05-00	\$19.95	\$19.95

SPM02

tcp

TUSSEY COMPUTER PRODUCTS

3075 RESEARCH DR
STATE COLLEGE, PA 16801

PRINTERS

Panasonic



PANASONIC
10911 II
(1100dpi, 80 cpi, 9-pin)

\$179



EPSON
LX-800
(1100dpi, 9-pin)

\$179



STAR
NX-1000
(1400dpi, 9-pin)

\$165



OKIDATA
320
(300dpi, 80 cpi, 9-pin)

\$339

1190 (1100dpi, 80 cpi, 9-pin) NEW	\$Call
1191 (1100dpi, 80 cpi, 9-pin) NEW	\$Call
1124 (1100dpi, 80 cpi, 24-pin)	\$340
1592 (1400dpi, 132 cpi, 9-pin)	\$380
1595 (1400dpi, 132 cpi, 24-pin)	\$460
1524 (2400dpi, 132 cpi, 24-pin)	\$479
4450 (1100dpi laser printer)	\$1479

EPSON

FX-850 (2400dpi, 80 cpi, 9-pin)	\$Call
FX-1050 (2400dpi, 132 cpi, 9-pin)	For
LQ-500 (2400dpi, 80 cpi, 24-pin)	Best
LQ-850 (2400dpi, 80 cpi, 24-pin)	Price
LQ-1050 (2400dpi, 132 cpi, 24-pin)	on
LQ-2550 (4800dpi, 132 cpi, 24-pin)	Epson

Call for EPSON LQ Rebate Offer!

STAR

NX-1000 Rainbow (1400dpi, 80 cpi, 9-pin)	\$220
NX-15 (1500dpi, 132 cpi, 24-pin)	\$340
NX-2400 (1700dpi, 80 cpi, 24-pin)	\$Call

OKIDATA

321 (300dpi, 132 cpi, 9-pin)	\$460
390 (2700dpi, 80 cpi, 24-pin)	\$460
391 (2700dpi, 132 cpi, 24-pin)	\$670
393 (4500dpi, 132 cpi, 24-pin)	\$Call

CITIZEN

1200 (1200dpi, 80 cpi, 9-pin)	\$139
1800 (1800dpi, 80 cpi, 9-pin)	\$159
MSP-40 (2400dpi, 80 cpi, 9-pin)	\$289
MSP-45 (2400dpi, 132 cpi, 9-pin)	\$379
MSP-55 (3000dpi, 132 cpi, 9-pin)	\$440
Premier 35 (Daytime)	\$Call
TriBunk 224 (2000dpi, 132 cpi, 24-pin)	\$540

HEWLETT-PACKARD

DesignJet (2400dpi, 80 cpi)	\$715
PageJet (1400dpi, 80 cpi)	\$1040

NEC

P2200 (1700dpi, 80 cpi, 24-pin)	\$350
P6200 (2400dpi, 80 cpi, 24-pin)	\$520
P5300 (2400dpi, 132 cpi, 24-pin)	\$680

TOSHIBA

P3215L (2100dpi, 80 cpi, 24-pin)	\$499
P415L (2100dpi, 132 cpi, 24-pin)	\$659
P3515SL (2800dpi, 132 cpi, 24-pin)	\$870

LASER PRINTERS

HEWLETT-PACKARD

LaserJet Series II

8 ppm/512K	\$1799
------------	--------

PANASONIC

NX-P4450	\$Call
----------	--------

QUME

Scripter	\$Call
----------	--------

10 ppm/Postscript	\$3349
-------------------	--------

EPSON

LQ 500	\$299
--------	-------

Call for other Epson LQ Rebates

Software orders over \$100 and Accessories under 6 pounds will be shipped Federal Express

(Even at these prices) You only pay TCP's standard shipping charge. Orders arriving before 4:00 PM our time will be shipped out same day. If part of your order is backordered this remainder will be shipped UPS Ground



SECURITY

- Your Credit Card is not charged until your order is shipped
- We insure your order at no extra cost to you.
- Tuesday is a financially strong and well established company

CUSTOMER SUPPORT

- Affair sales support
- Knowledgeable staff, all graduates of Tuesday's "Computer Boot Camp"
- Our advanced warehouse materials handling system assures your order is shipped out accurately & on time
- Our IBM AS400 allows instant and inventory status



SOFTWARE

AMERICAN

Design CAD 3.0 or 3-D	\$158
-----------------------	-------

ASHTON-TATE

dlbase III	\$Call
dlbase IV	\$499
Framework III	\$429

BORLAND

Turbo Pascal 5.0	\$99
Sprint	\$129
Paradox 3.0	\$479
Quattro	\$159
Sideways (unprotected)	\$57
Sideways	\$136
Turbo Basic	\$99
Turbo C 2.0	\$99
Turbo C Professional	\$159
Turbo Assembler/Debug	\$99
Turbo Lighting	\$81
Turbo Pascal Pro	\$159
Turbo Protog 2.0	\$99
Turbo Protog Toolbox	\$64
Turbo Tutor	\$99

BEDFORD

Integrated Accounting	\$136
-----------------------	-------

BRODERBUND

Print Shop	\$33
Print Shop Companion	\$29

CENTRAL POINT

Gen II PC	\$15
Deluxe Option Board	\$99
PC Turbo Charge 5.0	\$39

CHIPSOFT

Turbo Tutor	\$49
-------------	------

CORE

Corestat	\$119
----------	-------

DAC SOFTWARE

Doc Bonus Pack	\$70
Doc Easy Accounting	\$59
Doc Easy Light	\$39
Doc Easy Payroll	\$59
Load 3.0	\$Call
Call for Pricing on Tutors	

FIFTH GENERATION

Feedback Plus	\$104
---------------	-------

FORESIGHT

Draft CAD Ultra	\$260
-----------------	-------

FOX

Fdbase	\$199
--------	-------

FUNK

Always	\$69
Sideways	\$38

GENERIC SOFTWARE

Gen CAD Level 1.2 or 3	\$Call
------------------------	--------

INTUIT

Quickdraw	\$32
-----------	------

MECA

Managing Your Money	\$129
Tobias Tax Calc	\$47

MERIDIAN

Carbon Copy Plus	\$107
------------------	-------

MICROPRO

Wordstar Pro, Rel. 5	\$249
----------------------	-------

LOTUS

Agenda	\$Call
123	\$299
FameStar Plus	\$339
Symphony	\$430

Microsoft

Windows 386	\$94
PC Explorer	\$218
C Compiler	\$287
Flight Simulator 3.0	\$32
FORTRAN	\$299
Macro Assembler	\$99
Learning DOS	\$32
MS-DOS/Win BASIC	\$Call
Quick BASIC	\$99
Quick C	\$87
Windows/386	\$129
Word 5.0	\$Call
Works	\$99

PETER NORTON

Norton Commander	\$44
Norton Utilities	\$49
Norton Advanced Utilities	\$73

QUARTERDECK

DESQView 386	\$73
DESQView 386	\$118

REFERENCE SOFTWARE

Grammatical III	\$54
-----------------	------

SAMNA

Anti	\$99
------	------

SOFTVIEW

Tax View	\$67
----------	------

SOFTWARE PUBLISHING

First Publisher	\$74
First Publishing Force	\$49
Harvard Plus 3.0	\$Call
Harvard Graphics	\$Call
PS First Choice 3.0	\$99
Professional Film	\$124
Professional Print	\$99
Professional Write	\$119

SYMANTEC

Grandview	\$199
O & A	\$195
O & A Write	\$198
Timeline 3.0	\$Call

THREE D GRAPHICS

Perspective Junior	\$99
--------------------	------

WORD PERFECT

Data Perfect	\$294
Executive	\$125
Library	\$64
Word Perfect 5.0	\$719

XEROX

Ventura Publisher 2.0	\$475
-----------------------	-------

CIRCLE 246 ON READER SERVICE CARD

5-84002

OPEN: 8:00AM-11:00PM Mon-Fri, 10:00AM-8:00PM Sat, 12:00PM-8:00PM Sun EAST COAST TIME

CALL TOLL FREE 1-800-468-9044

For Information
Call: 514-234-2559
FAX: 514-237-4450



ZENITH

XT Turbo Computer System LIQUIDATION

20 MB
HARD
DRIVE!



Zenith is closing out this line of advanced personal computer systems. We've obtained them & can now offer them to you at UNBELIEVABLE SAVINGS!!

- 20 MB Hard drive, • 640 K.
- One 720K 3-1/2" disk drive.
- 8086 16 bit microprocessor at 16 MHz, • 84-key keyboard.
- IBM compatible
- 14" high resolution black & white monitor, • CGA compatible.
- High resolution graphics: 640 x 200
- Serial & parallel interfaces.
- Mouse port, • Includes a 300/1200 baud modem & 9-pin serial port
- Includes following software: MS-DOS 3.2, MS-DOS Manager, GW-BASIC & CPC communications software
- Dim.: 13"W x 14.5"H x 11"D (without keyboard), • Model # EZPC 20 plus EZAI upgrade.
- One Year Warranty!
- Factory New! Factory Perfect!

**ABILITY SOFTWARE
PRO BY MEGENT**
includes:
Database: Spreadsheet
Graphics, Word
Processing
Communication &
Presentation
Fully integrated
**DAMARK
PRICE:**
Item No. B-1225-115218
Insured Ship/Hand: \$5.20

Manufacturer's
Suggested Retail
\$1,999.00
DAMARK PRICE:
\$799

Item No. B-1225-115525
Insured Ship/Hand: \$29.50

**FOR FASTEST SERVICE
CALL TOLL FREE
1-800-950-9090**

MasterCard VISA DISCOVER

DAMARK INTERNATIONAL, INC.
8707 Shingle Creek Parkway Minneapolis, MN 55433
Customer Service: 812-566-8940

ZENITH XT Turbo Computer(s)
@ \$799 each, plus \$29.50 s/h each
Item No. B-1225-115525

ABILITY Software @ \$39 each, plus
\$5.00 s/h each. Item No. B-1225-115218
Min. res. add 6% sales tax.

Name _____
Address _____
City/State/Zip _____
☐ Check/MO ☐ VISA ☐ MasterCard ☐ Discover
Card No. _____
Exp. Date _____
DELIVERY TO 48 U.S. STATES ONLY

CIRCLE 483 ON READER SERVICE CARD

Your #1 Source For PC Products

HARDWARE

COMPUTERS		DRIVES/TAPE	
AST Premium	CALL	Miniscribe Drives	CALL
Everex Step	CALL	Prom Drives	CALL
Mitsubishi	CALL	Seagate Drives	CALL
NEC Multispeed	CALL	Bernoulli Box II	CALL
Samsung XT/AT/386	CALL	Archive XL 40MB Tape	338
Sharp Lightjet	CALL	Everex 60MB Tape	CALL

PRINTERS

Alps Allegro 24	359
Epson LX800	185
Epson TX100/TMY	CAL
NEC P2200/5200	CAL
Panasonic P1191	259
Panasonic-Minolta	CAL
QMS PSB10 Laser	CAL
QMS Print II	1479
Norix 4020 color	909

BOARDS

Paradise VGA Plus	275
Prodesigner VGA	315
EGA Wonder 800	339
Super VGA	309
V Star VGA	499
TOMS Flashcard	153
AST Ram Cards	CAL
Above Board Plus	419
Nach 20 Turbo	329

OTHER HARDWARE

Murata 1200	609
Paratex V-150	1049
Sharp FO 550	1550
Panasonic Fax 3600	659
Compaq Fax 3600	659
Logitech Scorpion 400	275
Evercam 24+	137
Keyex Modems	CAL
Practical Modems	CAL
Datascopy 730	1099
Practical Modems	CAL
Summagraphics Plus	379
Resound DVI 1100	899
Swivel R500	645
Amtek Smart Scan	509
Diamond Scan 14	539
Multitree 2A	539
Princeton Ultratrane	495
Sony 1302P	609

SOFTWARE

ACCOUNTING	SPREADSHEETS
Acc. Pro BPI	249
Bedford Int. Accounting	149
Doc. 17 Accounting	59
New Views	CAL
Open Systems	CAL
Timetris II	115
Tim Prep SW	CAL

DATABASE

Advanced Revolution	469
Ask Sam	175
Databases	CAL
Database II	CAL
CD Al Diamond	115
Fast Base II	205
Lotus Agenda	249
Q & A	217
Rapid File	185

GRAPHICS

Byline	185
Movie Maker 3.0	CAL
First Publisher 2	75
Publish II	119
Auto Sketch	52
Drills Ultra	205
Design Card or 3D	159
Diagram/2000	225
Draw Applets	275
EGA Paint V2/305	87
Freelance Plus	309
Graphic Card 3D	139
Harvard Graphics	275
How Potter FX	225
Gurus Mouse/Dr. Halo	59
Microsoft Mouse	103

WORD PROCESSING

Microsoft Word 5.0	95
Multimedia Advantage II	275
MS Word 5.0	95
MS Word 5.0	95
MS Word 5.0	95
MS Word 5.0	95

UTILITIES

Claris	409
Quick Backup	64
Turbo Pascal/C	95
Designview 2.0	75
Windows	64
Windows Development Kit	319
Desk II	95
Desk II	95
Desk II	95
Desk II	95
Desk II	95

800-662-2686 orders only
for Ca, Orders, Tech Support, 415-255-2230

Call for Other Products

Corporate Accounts Welcome • No Credit Card Charge

PAYMENT: Visa, MasterCard, Cashier's checks, Personal Checks with hold. Qualified P.O.'s. Orders add sales tax.

SOFTWARE SHIPPING—UPS ground 2% of order, 5 min. UPS Blue 3% of order, \$7 min.

HARDWARE—Call for charges. DEFECTS: Replaced or repaired at our option. RETURNS: Subject to restock fee. All Products New with full warranty.

Price & availability subject to change without notice.



584 CASTRO ST., SUITE 487 SAN FRANCISCO, CA 94114

Call for Free Catalog

**Feature Packed
Turbo 286
\$899!**

Try our extremely popular machine for 30 days without risk for 30 days without risk! Has Intel 80286-10 microprocessor switchable 10MHz to 6MHz, math coprocessor support, full 640K RAM, hard disk controller, 1.2MByte drive, full size metal case with six 18 bit and two 16 bit expansion slots. Also includes a 200W power supply and high resolution mono graphics adapter, parallel printer output, real-time lithium clock, and "AT" style keyboard. FCC approved. Full year warranty by our own service department. (Shown with optional monitor.)

386 Tower \$1,999

20MHz Intel 80386-20 microprocessor and 1MByte of 70ns RAM with 80387 and Weitek support. 1.2MByte drive, floppy/hard drive controller, a parallel and two serial ports, five drive slots. Five 18 bit, one 8 bit, and two 32 bit expansion slots. Includes 101 key keyboard, hi-res mono adapter. FCC approved. Full year warranty, 30 day free trial!

Turbo XT \$649

Our workhorse TENNESSEE Turbo PC/XT in a metal "AT" style case, runs at 10MHz/4.77MHz, full 640K RAM, eight 8 bit slots, and coprocessor support. Includes 386K drive, and "AT" style keyboard. FCC approved. Full year warranty by our own service department. 30 day free trial!

**Installation FREE with any system above!
Hard & Floppy Drives**

360K 5.25" Floppy Drive	\$79.95
720K 3.5" Floppy Drive	\$99.95
1.44MByte 3.5" Floppy Drive	\$99.95
1.2MByte 5.25" Floppy Drive	\$99.95
Seagate ST1225 20MByte + WD Controller (XT)	\$329.95
Miniscribe 8436 30MByte + WD Controller (XT)	\$299.95
Miniscribe 3650 40MByte 81mm	\$319.95
Miniscribe 3653 43MByte 25mm	\$439.95
Miniscribe 6085 73MByte 20mm	\$559.95

Sensational Printers

Siar KX-1000 \$164.95	Siar KX-2400 \$299.95
Panasonic KX-P1180, 192 cps, 9", 2 year	\$189.95
Panasonic KX-P10621, 240 cps, 9", 2 year	\$129.95
Panasonic KX-P1124, 240 cps, 9", 2 year	\$194.95
Panasonic KX-P1095 240 cps, 16.5", 1.5", 2 year	\$499.95
Panasonic Laser Printer (DIP compatible)	\$1,799.95

Terrific Displays

Magnavox VGA w/ VGA Graphic Board	\$869.90
Magnavox EGA w/ EGA Graphic Board	\$839.90
Magnavox CCA w/ CCA Print/Graphic Board	\$319.90
Magnavox Amber w/ Printer/Graphic Board	\$159.90
Hi Res Amber Hyundai (Blue Chip) SALE	\$79.95

Amazing Monitors

1200 Internal Auto Dial/Ana. Software, 2 year	\$49.95
2400 Internal Auto Dial/Ana. Software, 2 year	\$89.95
1200 External Auto Dial/Ana. LED's, 3 year	\$79.95
2400 External Auto Dial/Ana. LED's, 3 year	\$119.95

Use Visa or MC at no charge. Call for Free Shipping Charges, Corporate P.O.'s Welcome, DFB Labeled, Prices and Specifications May Change.

**TENEX
Computer Express™**

Join over 100,000 Satisfied Customers!

P.O. Box 6578, South Bend, IN 46660 219-259-7051

Toll Free 1-800-348-2778
FAX (219) 255-1778

CIRCLE 220 ON READER SERVICE CARD

COMPUTER DISCOUNT WAREHOUSE™



**WHY PAY
RETAIL?**

Nobody Sells

ZENITH data systems **For Less**



ALL ZENITH data systems AT LOWEST EVER **DISCOUNT** PRICES



ZCM-1490

PC Magazine
Hardware Equipment Award of the Year

**Zenith Data Systems
New Technology
Flat Screen Monitor that
displays like a back lit slide**

Zenith Data Systems newly developed ZCM-1490 monitors perfectly flat and nearly reflection free tube creates a video image with colors so vivid and brilliant that it easily outperforms costly professional graphic displays. CDW™ has it at a price comparable with old technology color monitors.

CDW™ is an authorized
ZENITH data systems
DEALER

CDW™ stocks a full line of products to support every computer need.

See our other
advertisements
in this issue.

ZENITH data systems

SUPERSPORT

Portable Personal Computers

SUPERSPORT & SUPERSPORT 286

The new SUPERSPORTS are unquestionably the superior computers on the road today. Equip them with fast hard drives and EMS memory and these machines are as complete a computer as most any you have on your desk.

The SUPERSPORT comes standard with two 720 K, 3 1/2-inch drives, 640 K RAM, 8 MHz clock speed, detachable power pack and total PC/XT compatibility. Add a 20 Meg hard drive and EMS memory, and this machine will surpass any desktop units.

The SUPERSPORT286 Model 20 has everything you need in a computer with many things that you wouldn't expect to find in a portable. 12 MHz processing speed with no wait states, memory up to 20 Meg, a 28 ms 20 Meg hard drive, and a remarkable 600x400 display, the Model 20 will never leave you lacking.

CDW™ offers the SUPERSPORT and the SUPERSPORT286 at prices that make these two great machines unsurpassed buys.



TURBOSPORT 386

Now you don't have to leave your 386 on your desk. The TURBOSPORT386 is the computer that satisfies the most demanding computer owner, and allows you to take it with you.

The no-wait-state 80386, operates at 12 MHz. With the standard 2 MByte RAM and the built-in 28-ms, 40-Meg hard drive, the TURBOSPORT386 Model 40 will breeze through your most demanding applications without hesitation. The 640x400 paper white, fluorescent backlit display is the finest found on any portable. The standard 2400 Baud modem makes the Model 40 a complete machine no matter where you take it.

Now, you don't have to settle for less. CDW™ has the lowest prices ever on this hot machine.

Zenith Data System's Z-248/12 and Z-386
offer the very best in desktop computing.

Z-248/12

The Z-248/12 is a 286 machine that operates at 12 MHz, with no wait states. With four open 16-bit slots, the Z-248 can grow as your demands grow. Pick from a complete list of optional displays and hard drives, and make this computer one that will stay on your desk for many years.

Z-386

The Z-386 is the ultimate desktop computer. Its no-wait-state, 16 MHz Intel microprocessor allows the Z-386 to speed through even the most demanding operations. The Z-386 comes with 1 MByte RAM standard and is expandable in 1 or 4 MByte increments. Add virtually any option and configure the Z-386 to meet your requirements.



CDW™ carries over \$4,000,000.00 in inventory for all your computer needs.

Call CDW™ for custom quotes on
Zenith Data Systems entire line of products.

If you find a better price
call us before you buy.

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!



Check Card charges are not additional. Prices are quoted in dollars and include shipping and handling charges. All prices are subject to change without notice. All prices are subject to change without notice. All prices are subject to change without notice.

(312) 498-1426

Outside Illinois 1-(800) 233-4426 FAX (312) 291-1737

CHARTER MEMBER
MMC
NATIONAL COMPUTER
MANUFACTURERS COUNCIL
of the Direct Marketing Association, Inc.
MEMBER

DFI Handy Scanner

and 3 Button Mouse for IBM PC/XT/AT

FREE OPE Software with HS3000!

The HS3000 offers a full A4 inch window at 400dpi resolution. Scan photos, logos, drawings, etc. Can be used with today's most popular applications.

HS3000	Handy Scanner	\$199.95
DSM200	2000PI 3 Button Ser. Mouse	\$49.95
DSM200S	2000PI 3 Button Ser. Mouse	\$59.95

Pentagon Systems, Inc.

Security Access Card

for IBM PC/XT/AT and Compatible Computers

The SACS is an advanced control card that prevents unauthorized access to your computer through user passwords. Protects your computer against infection and corruption at times. Access up to 10 programs and accessories. Menu driven - Manual included - One Year Warranty.

SACS1	Security Access Card	\$149.95
-------	----------------------	----------

Intel Connection Coprocessor, Modern, Inboard

386/PC & Above PLUS

CB6000 only. Send receive FAXes or EMAIL, and keep on going while all this runs in the background. Easy to use. No other software. Includes 256K RAM.

CB6000	Connection Coprocessor	\$799.95
CB6010	Modern Coprocessor for CB6000	\$289.95

IB1200	Inboard 386 PC w/1MB RAM	\$699.95
MB4420	Above Board 286 Plus with 512K RAM	\$429.95
MB4420	Above Board 286 Plus with 512K RAM	\$529.95

Star Multi-Font Dot Matrix Printer

• 8 pin dot matrix print head
• Connects parallel or serial interface - Epson or IBM model
• Print in Courier, Standard, Draft 1, and 2
• 12 pin dot matrix Print. Price and set in all models.

NX1000	Star Multi-Font Dot Matrix Printer	\$199.95
--------	------------------------------------	----------

IBMx86 Switch Boxes

• Female Connectors
• All Pins Switched

Part No.	Description	Price
JI1170	DB9 pin A/B Switch	\$22.95
JI1171	DB25 pin A/B/C Switch	\$27.95
JI1172	DB25 pin A/B/C Switch	\$29.95
JI1173	Centronics 36 pin A/B Switch	\$24.95
JI1174	Centronics 36 pin A/B/C Switch	\$27.95

Jameco 255K Smart Parallel Printer Buffer and Parallel/Serial Converter

PP25K. 256K RAM high speed buffer accepts data from your computer at a very fast rate and outputs it to your printer when you keep working. • Fits into 36 pin Centronics connector. • SP100 & PS100 - Serial to Parallel and Parallel to Serial Converters • Features one female DB25 and one male 36 pin connector.

PP25K	256K Parallel Printer Buffer	\$199.95
SP100	Serial to Parallel Converter	\$59.95
PS100	Parallel to Serial Converter	\$59.95

1295 Shensway Road Belmont, CA 94002

24 Hour Order Hotline (415) 592-8097
FAX: (415) 592-8123 or (415) 595-7054
Telex 176043 ARS. Back Jameco Birt Data Sheets - 50c each
Send \$2.00 Postage for a FREE 1989 CATALOG

1989 Jameco Electronics
IBM is a registered trademark of International Business Machines

IBM PC/XT/AT Compatible 101-Key Enhanced Keyboard with Calculator

With Solar Calculator!

JE1016 (only): Solar powered calculator offers ease and convenience of use - 101 key - Enhanced keyboard layout - Tactile touch keyswitches - 12 function keys - 6 illuminated LED indicators for Num Lock, Caps Lock and Scroll Lock - Separate cursor pad - Low profile design - Switchable between PC/XT or AT

JE1016	Enhanced 101 Key PC/XT/AT Keyboard with Calculator	\$79.95
JE1016	Enhanced 101 Key PC/XT/AT Keyboard	\$69.95
JE1015	Standard 84 Key PC/XT/AT Keyboard	\$59.95

IBM COMPATIBLE DISPLAY MONITORS

AMBER	12" Amber Mono	\$99.95
CTK2410	14"RGB 640x200	\$279.95
TM5154	EISA 14" 720x560	\$369.95
JE1089	EISA Monitor & Card	\$519.95
TM5155	14" Multisync 800x560	\$499.95
OC1478	14" VGA 720x480	\$449.95
JE1055	VGA Monitor & Card	\$649.95

JAMECO IBM PC/XT/AT COMPATIBLE CARDS

JE1041	2048MB Hard Disk Controller Card (PC/XT)	\$79.95
JE1043	360K/2MB 1.2MB/1.44MB Floppy Disk Controller Card (PC/XT/AT)	\$49.95
JE1044	360K/2MB 1.2MB/1.44MB Floppy Disk Controller Card (PC/XT/AT)	\$49.95
JE1045	360K/2MB 1.2MB/1.44MB Floppy Disk Controller Card (AT)	\$149.95
JE1050	Monochrome Graphics Card w/Parallel Printer Port (PC/XT/AT)	\$59.95
JE1052	Color Graphics Card w/Parallel Printer Port (PC/XT/AT)	\$49.95
JE1053	EISA Card w/256K Video RAM (PC/XT/AT)	\$159.95
JE1054	Enhanced 8 Bit VGA Card w/512K Video RAM (PC/XT/AT)	\$129.95
GC1501	Onch 8 Bit 8 Bit VGA Card w/256K Video RAM (PC/XT/AT)	\$349.95
JE1060	16 Card w/Serial Game Printer Port & Real Time Clock (PC/XT)	\$59.95
JE1061	RS232C Serial Half Card (PC/XT)	\$29.95
JE1062	10 Card w/Serial Game Printer Port & Real Time Clock (PC/XT)	\$34.95
JE1063	10 Card w/Serial Game Printer Port & Real Time Clock (PC/XT)	\$59.95
JE1071	Multi I/O Card w/Controller & Monochrome Graphics (PC/XT)	\$119.95
JE1081	2MB Expanded or Extended Memory Card (one K on board) (AT)	\$119.95

SEAGATE HALF-HEIGHT HARD DISK DRIVES

ST225	2048 MB Drive only (PC/XT/AT)	\$224.95
ST225XT	2048 MB w/Controller (PC/XT)	\$269.95
ST225AT	2048 MB w/Controller (AT)	\$339.95
ST232	3048 MB Drive only (PC/XT/AT)	\$249.95
ST232XT	3048 MB w/Controller (PC/XT)	\$299.95
ST232AT	3048 MB w/Controller (AT)	\$369.95
ST251	4048 MB Drive only (PC/XT/AT)	\$379.95
ST251XT	4048 MB w/Controller (PC/XT)	\$419.95
ST251AT	4048 MB w/Controller (AT)	\$489.95
ST251-1	4048 MB Fast 20ms (Drive only)	\$449.95
ST277	6048 MB Drive only (PC/XT/AT)	\$449.95
ST277XT	6048 MB w/Controller (PC/XT)	\$499.95
ST277AT	6048 MB w/Controller (AT)	\$569.95

IBM PC/XT/AT COMPATIBLE MOTHERBOARDS

JE1001	4 77MHz (PC/XT)	\$99.95
JE1002	4 77MHz (PC/XT)	\$109.95
JE1003	8 33MHz (AT)	\$329.95
JE1004	8 33MHz (AT)	\$469.95
JE1020	8 33MHz 80386 (AT)	\$119.95
JE1021	8 33MHz 80386 (AT)	\$149.95
JE1025	Full Size 25MHz 80386 (AT)	\$229.95

IBM PC/XT/AT COMPATIBLE 3.5"/5.25" DISK DRIVES

3BKU	3.5" 720KB (PC/XT/AT)	\$109.95
364KU	3.5" 1.44MB (PC/XT/AT)	\$129.95
JE1020	5.25" 360KB (PC/XT/AT) Black	\$89.95
JE1021	5.25" 360KB (PC/XT/AT) Blue	\$89.95
JE1022	5.25" 1.2MB (PC/XT/AT) Segor	\$99.95

IBM PC/XT/AT COMPATIBLE MODEMS

1200P	1200/300 Baud Packer Style Modem (PC/XT/AT)	\$99.95
1200H	1200/300 Baud Internal Modem w/Multiplex Comm. Software (PC/XT/AT)	\$99.95
2400H	2400/1200 Baud Internal Modem w/Multiplex Comm. Software (PC/XT/AT)	\$129.95
1200E	1200/300 Baud External Modem w/Multiplex Comm. Software (PC/XT/AT)	\$99.95
2400E	2400/1200 Baud External Modem w/Multiplex Comm. Software (PC/XT/AT)	\$169.95

Jameco
ELECTRONICS

24-Hour Order Hotline (415) 592-8097

The Following Phone Lines Are Available From 7AM - 5PM P.S.T.:
• Customer Service (415) 592-8121 • Technical Assistance (415) 592-9990 • Credit Department (415) 592-9983 • All Other Inquiries (415) 592-7106

RIX EGA and VGA Paint Software

Features: • Pop-up menu • Zoom image window • 6 to 12 zoom levels • 34 contemporary fonts • Line smoothing • Mouse-keyboard over screen • Print capability for almost any dot matrix, color or laser printer • Slide show capability

EGAP	EGA Paint Program	\$79.95
VGAP	VGA Paint Program	\$119.95

Additional Software Products

SCPLUS	Diagram Speeches - Start	\$49.95
EME	Diagram Extended Memory	\$39.95
EZDOS	Digital Research DOS	\$49.95
EZDOSP	MultiDOS	\$69.95
RRM	Real Rider Comm. (RM) (MAC)	\$69.95

30MB Hard Disk Card for IBM PC/XT

Features: • Pop-up menu • Zoom image window • 6 to 12 zoom levels • 34 contemporary fonts • Line smoothing • Mouse-keyboard over screen • Print capability for almost any dot matrix, color or laser printer • Slide show capability

SA30	30MB Hard Disk Card	\$379.95
------	---------------------	----------

Kyocera 3.5" 20 and 30MB Hard Disk Drives for IBM PC/XT/AT

CK20	3.5" 20MB Drive Only	\$129.95
CK30B	3.5" 30MB Drive Only	\$239.95

40MB Tape Back-Up for IBM PC/XT

DJ10	40MB Tape Back-Up and Tape	\$349.95
TB40	40MB Tape Cartridge	\$24.95

Computer Accessories

JE1198	Universal Power Stand	\$9.95
JE1199	To Serial Monitor Board	\$11.95
JE1200	To Serial Monitor Board w/Par. Cn	\$39.95
JE1203	Mat Keyboard Drive	\$34.95
JE1204	Adjustable Copy Holder	\$14.95
JE1205	60 Column Printer Stand	\$13.95
JE1206	132 Column Printer Stand	\$14.95
JE1207	Adjustable CRT Stand	\$59.95

Additional IBM Compatible Accessories

JE1010	File Top Standard PC Kit Case	\$34.95
JE1014	File Top Battery Kit Turbo Case	\$69.95
JE1017	File Top Battery Kit Turbo Case	\$69.95
JE1018	File Top Battery Kit Turbo Case	\$69.95
JE1019	150 Watt Power Supply	\$59.95
JE1020	200 Watt Battery Kit Power Supply	\$99.95
JE1031	Tower Case w/50 Watt Power Supply	\$299.95

RAM, V20 & Intel Math Coprocessors

4164-150	65536K 150MHz	\$2.50
4164-150	262 144K 100MHz	\$12.45
4164-150	262 144K 100MHz	\$11.95
4164-150	262 144K 100MHz	\$11.40
5040-150	5040K V20 Chip (Requires 8088)	\$7.40
UPD70195-8	80195 V20 Chip (Requires 8088)	\$9.40
8087-2	8087 V20 Chip (Requires 8088)	\$139.95
8087-1	8087 V20 Chip (Requires 8088)	\$139.95
8087-1	8087 V20 Chip (Requires 8088)	\$139.95
51100K-1	1 048 512K 110MHz	\$29.95

\$20.00 Minimum Order - U.S. Funds Only
CA Residents: Add 6%, 6.5% or 7% Sales Tax
Shipping: Add 3% plus \$1.50 Insurance

Terms: Prices subject to change without notice
We reserve the right to substitute manufacturers
Items subject to availability, and prior sale
Products pictured may only be representative

Complete list of terms/conditions is available upon request

COMPUTER DISCOUNT WAREHOUSE™

**OVER
\$4,000,000.00
INVENTORY
IN STOCK**

EPSON REBATES
up to **\$100**
Call and ask
Expires 4-30-89

**WHY PAY
RETAIL?**
Nobody Sells
EPSON® For Less



ALL EPSON® MODELS READY TO SELL AT LOWEST EVER DISCOUNT PRICES

EPSON®

Quality computer products that deliver
outstanding performance and value
at prices only

EPSON®

COMPUTER DISCOUNT WAREHOUSE™ can offer!



LQ-500

- 180 cps in draft mode
- 60 cps (12 CPI) in Near Letter Quality mode
- Friction and Tractor feed
- Automatic single-sheet loading
- Two resident Letter-quality fonts
- "Shadow" and "Outline" print
- Front panel controls

Options

- Cut-sheet feeder
- LQ software for Microsoft Windows



LQ-850

- 264 cps in draft mode
- 88 cps in Near Letter Quality mode
- 6K buffer
- SmartPark paper handling
- Front panel controls

Options

- Tractor Feed
- Cut-sheet feeder
- 32K buffer



LQ-950

- Horizontally prints graphics on 11" wide paper
- 264 cps in draft mode
- 88 cps in Near Letter Quality
- 8K buffer
- SmartPark paper handling

Options

- Tractor Feed
- Cut-sheet feeder
- 32K buffer



LQ-2550

- 324 cps (Elite 12 CPI) in draft mode
- 405 cps (Elite 15 CPI) in ultra high-speed mode
- 106 cps (Elite 12 CPI) in Near Letter Quality mode
- 8K buffer
- 5 Letter quality fonts
- Front panel controls with LCD display

Options

- Single and dual-bin cut-sheet feeders
- Color enhancement
- 32K buffer

**WHY BUY
FROM
CDW?**

Because Computer Discount Warehouse™ has a well-recognized commitment to customer satisfaction. In a survey of a random sampling of over 40,000 customers

✓ nearly 95% responded that they would recommend us to a friend.

✓ 95% said that our product selection was better than average

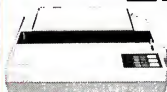
✓ 97% approved of the product knowledge of our salespeople.

James Martin, Publisher of PC World Magazine wrote to CDW™,

"Thank you for your customer orientation and excellent service record... I do not know how you do it, but I hope you keep it up."

✓ Because we are so well recommended.

EPSON®



EX-800

- 300 cps (12 CPI) in draft mode
- 54 cps in Near Letter Quality
- 8K buffer
- 2 typesets
- Front panel controls
- Push tractor feed
- Single sheet loading

Options

- Color enhancement
- 32K buffer



LX-800

- 180 cps in draft mode
- 30 cps in Near Letter Quality mode
- 8K buffer
- 80 column
- Friction and tractor feed
- Automatic single-sheet loading
- Front panel controls
- IBM ProPrinter character set



FX-850 FX-1050

- 264 cps in draft Elite mode
- 54 cps in Near Letter Quality
- 8K buffer
- 136 column (FX-1050)
- Friction and tractor feed
- Automatic single-sheet loading
- Front panel controls

Options

- Cut sheet feeder w/envelope feed capability
- Serial interface

**AUTHORIZED
EPSON® DEALER**

**MOST ORDERS SHIPPED
WITHIN 48 HOURS.**

**Call CDW for custom quotes
on our entire line of products.**

**If you find a better price
call us before you buy.**

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!

Nationwide Toll Free

(800) 233-4426

In Illinois (312) 498-1426 FAX (312) 291-1737

**CDW™ stocks a full line
of products to
support every
computer need.**

CIRCLE 109 ON READER SERVICE CARD



CHARTER MEMBER
MMC
MICROCOMPUTER
MARKETING COUNCIL
of the Direct Marketing Association, Inc.
MEMBER

Complete Kit w/Controller

Hard Disk**\$148**

1200 Baud w/Software

Modem**\$48**

Jade 10 MHz Turbo XT \$398
 640K Motherboard w/256K RAM
 10MB Disk Controller
 140 Watt Power Supply
 101 Enhanced Keyboard

Monochrome Graphics System \$698
 640K RAM, 360K Disk Drive
 Printer Port, Amdek 310A Monitor
 30 MB Hard Disk System add \$298
 CGA Color System add \$188
 EGA Color System add \$398
 VGA Color System add \$568

Jade 12 MHz Turbo 286 \$898
 1 MB Motherboard w/512K RAM
 200 Watt Power Supply
 Clock/Calendar
 Enhanced 101 Keyboard

Mono Graphics System \$1098
 1.2 MB Floppy Drive & Controller
 Printer Port, Amdek 310A Monitor
 40 MB Hard Disk System add \$438
 12 MHz, 1 MB of RAM add \$148

Jade 20 MHz Turbo 386 \$1998
 1 MB of RAM on Motherboard
 1.1 Interleave FDD/HD Controller
 2 Serial, 1 Parallel, Clock, Calendar
 101 Enhanced Keyboard

4.2 MB Mono Graphics System \$2388
 12 MB Floppy Disk Drive
 40 MB Hard Disk Drive
 Amdek 310A Monitor

Disk Drives
 360K half height \$68
 360K full height \$118
 TEAC 55 VB \$78
 1.2 MB for AT \$98
 3 1/2" 720K \$98
 3 1/2" 1.44 MB \$118
 5 1/4" ext. 360K for PS/2 \$218
 5 1/4" ext. 1.2 MB for PS/2 \$258
 5 1/4" ext. for LaTop \$298

Hard Disk Drives
 10 MB w/controller \$148
 20 MB w/controller \$228
 30 MB w/controller \$268
 40 MB w/controller \$398
 40 MB for AT \$338
 ST 125 20 MB \$248
 ST 138 30 MB \$298
 ST 251 40 MB \$368
 ST 251-1 40 MB \$448
 ST 4096 80 MB \$568

Tape Back-up
 CMS Jumbo 40 MB XT/AT \$298
 XT/AT Kit External \$128
 PS/2 Internal Kit \$58
 PS/2 External Kit \$128

Monitors
 Amdek 310A amber \$98
 Amdek 410A amber \$118
 14" amber flat screen \$128
 RGB 640 x 240 color \$258
 EGA 640 x 350 color \$378
 VGA 800 x 560 \$488
 NEC MultiSync II Call
 NEC MultiSync II 2A \$528
 Mitsubishi Diamond Scan \$498
 Zenith 1490 flat screen \$618
 Sony 800 x 600 Multi Scan \$488

Keyboards
 84 Key AT-style \$68
 101 Key enhanced \$78

Printers
 EPSON LX-800 9 PIN \$188
 EPSON FX-850 \$50 Rebate
 EPSON FX-1050 Call
 EPSON FX-800 Call
 EPSON DFX-5000 Call

EPSON LO REBATE
THROUGH 4-30-89
 EPSON LQ-500 24 PIN \$25 Rebate
 EPSON LQ-850 \$50 Rebate
 EPSON LQ-850 \$75 Rebate
 EPSON LQ-1060 \$100 Rebate

Okidata 320 \$348
 Okidata 321 \$498
 Okidata 390 \$498
 Okidata 391 \$648
 Okidata 393 \$948

Panasonic KX-P1180 \$178
 Panasonic KX-P1191 \$239
 Panasonic KX-P1124 \$318
 Panasonic KX-P1592 \$388
 Panasonic KX-P1092J \$318
 Panasonic KX-P1595 \$438
 Panasonic KX-P1524 \$538
 Panasonic KX-P4450 \$1548

Daisywheel Printer
 40 CPS Parallel and serial \$199

Hewlett Packard DeskJet
 DeskJet \$698
 128K PDP Desk RAM \$98
 EPSON emulation cartridge \$68
 TMS RM/HELV Soft Font \$98
 Ink cartridge \$19

Hewlett Packard LaserJet
 LaserJet II Call
 LaserJet IId Call
 25 in One Font Cartridge \$398
 4 MB card w/o memory \$188
 1 MB memory card \$348
 2 MB memory card \$648
 4 MB memory card \$1148
 Toner cartridge \$98

Terminals
 WYSE model 30 \$288
 WYSE model 50 \$368
 WYSE model 85 \$438

Joystick
 Kraft 3 button Joystick \$19
 Dual Game Port \$19

Plotter
 Roland DXY 885 \$898
 Houston Intruments Call
 Hewlett Packard all models Call

Scanner
 Complete Hand Scanner \$148
 Complete 4" Scanner \$198
 Logitech Scan Man \$248
 Diamond Flower 3000 \$198
 Hewlett Packard ScanJet Call

Digitizers
 Summa Sketch 12 x 12 \$378

Mouse
 Opto-mechanical \$29
 with Software

LogiTech
 LogiMouse Serial \$68
 LogiMouse Bus \$78
 LogiMouse Hi-res \$88

Mouse Systems
 PC Mouse with Paint \$88

Microsoft
 Mouse w/Paintbrush \$98
 Mouse w/CAD Call
 Mouse w/Window Call

Complete PC
 Complete FAX 4800 \$228
 Complete FAX 9600 \$388
 Complete Answering Machine \$248

Switch Boxes
 Parallel or Serial (Specify)
 2 way AB \$28
 3 way ABC \$38
 4 way ABCD \$38
 5 way ABCDE \$68
 Crossover X \$68
 AutoSwitch 3 way \$198
 AutoSwitch 6 way \$248

Modems
 1200 Internal w/software \$48
 2400 Internal w/software \$98
 1200 external \$88
 2400 external \$148
 2400 PS/2 Internal \$198
 Intel 2400B for PS/2 \$278

Intel
 8087 \$94
 8087-2 \$138
 8087-SX \$348
 8087-1 \$178
 8087-16 \$398
 80287-8 \$148
 80287-20 \$398
 80287-8 \$218
 80387-25 \$528
 Above board PC 64K \$488
 Above board 286 Plus 512K \$418
 In board 386 \$1028

Cables
 6' printer \$12
 10' printer \$18
 25' printer \$28
 9' serial \$18
 25' serial \$38
 50' serial \$38
 100' serial \$58
 Keyboard extender \$12
 Monitor extender \$16
 Printer extender \$18

Boards
 Monographics w/Parallel \$48
 Color Graphics w/Parallel \$48
 EGA card \$158
 VGA card \$268
 Dual game port \$19
 XT I/O Par/Ser/Cik/Game \$58
 AT I/O Par/Ser/Game \$58
 360/720K 1.2/1.44 MB FDC \$48
 AT FDD/HD controller \$128
 XT Hard Disk controller \$58
 AST SixPak Plus \$118
 AST XFormer \$178
 Paradise auto EGA 350 \$168
 Paradise VGA+ \$268
 Paradise VGA+ 16 \$318

Surge Protector
 S.L. Waber 6 outlet \$18
 Isobar 4 outlet \$48
 Isobar 8 outlet \$68
 Isobar model protector \$24

Tripplett Battery Back-up
 450 Watt UPS \$398
 750 Watt UPS \$498
 1200 Watt UPS \$698

Tripplett Line Stabilizer
 600 Watt LC \$98
 1200 Watt LC \$158
 1800 Watt LC \$188

Accessories
 Kensington Master Piece \$88
 Master Control Center \$488
 MicroSpeed PC-Trac Ball \$78
 Vertical CPU stand \$18
 Keyboard drawer \$58
 Monitor Tilt-n-Swivel \$18

4901 W. Rosecrans Ave. Box 5046
 Hawthorne, California 90251-5046



California

Torrance, Santa Ana, Woodland Hills
 Kearny Mesa, Sunnyvale
 Texas

Addison, Houston
 Georgia Arizona
 Smyrna Phoenix

Not all items in stock at
 our nine retail locations.

CIRCLE 243 ON READER SERVICE CARD Fax machine 1-213-6755-222/All others 1-213-973-7707



We accept checks, credit card or purchase
 orders from qualified firms and institutions.
 No surcharge on credit card orders. CA, TX,
 GA, & AZ residents add sales tax. Prices and

availability subject to change without notice.
 Shipping and handling charges via UPS
 ground \$06/lb. UPS air \$1.00/lb. Minimum
 charge \$4.00.

JADE COMPUTER

Place orders and use our technical support toll free!

Continental U.S.A. 1-800-421-5500 Inside California 1-800-262-1710



March Specials

Zenith 1490 Monitor	\$678.00
NEC Multisync II	580.00
Desktop Scanner & Interface	1400.00
HP RuggedWriter W/CFF	1150.00
64 KB Chip Set	25.00
Canon Laser Printer	1510.00

—PIICEON—

COMPAG MEMORY MODULES
FOR DESKPRO 386/20, 25 & 202E

4 MB Memory Modules	\$1705
1 MB Memory Modules	557
4 MB System Memory Board	1758

—AST—

Premium/286-MDL80	\$1336
Premium/286-MDL90	1999
Premium/286-MDL120	2329
Premium/286-MDL140X	2268
Premium/286-MDL170	3064
Premium/286-MDL340	3972
Rampage 286 0K	284
Rampage 286 512K	399
Rampage/2-286 0K	284
Rampage/2-286 512K	573

COMPUTER OASIS (813) 289-6598

Complete Systems Available • Quantity Pricing Available

P.O. BOX 23666 • TAMPA, FLORIDA 33623

MONDAY-FRIDAY 9:00 A.M.-6:00 P.M. EST.

PRINTERS

—EPSON—

LX-800	\$184
FX-850	349
FX-1050	489
EX-800	419
LQ-500	329
LQ-650	529
LQ-1050	729
LQ-2550	939
DFX-5000	1369

—CITIZEN—

180D	\$179
MSP-15E	339
MSP-25	399
MSP-40	289
MSP-45	429
MSP-50	339

—OKIDATA—

393	\$929
320	338
321	464
390	460
391	635

—NEC—

2200	\$349
5200	519
5300	699
LC-860 Laserwriter	2012
LC-890 Laserwriter	3279
Powermate 386/20 w/42 MB HD	3622
Prospeed 286-20 MB	3314

—HARD DRIVES—

20 MB w/controller	\$279
30 MB w/controller	298
40 MB w/controller	478

—TAPE BACK UPS—

20 MB for AT/XT	\$329
20 MB for PS/2	329

—INTEL—

8087-2 MATH CO-PRO	\$150
8087-10 MATH CO-PRO	230
80387-20 MATH CO-PRO	495
ABOVEBOARD 286/512K	380
ABOVEBOARD 286-PS/512K	395

—SOFTWARE—

Wordstar Professional 3.31	\$247
Lotus Symphony	445
Microsoft Word 5.0	230
Microsoft Excel for Mac 1.5	259
Multiplan 4.0	129
Aldus Pagemaker	499
Adobe Illustrator Window	395
Xerox Ventura Publisher	519
Lotus 123	295
Auto Cad Ver. 1.0	1967

DESKTOP PUBLISHING

1 MB Memory for HP Laser Jet II	\$339
2 MB Memory for HP Laser Jet II	669
25 in 1 Font for HP Laser Jet	309
Microsoft Mouse Serial/Bus	105

**WE ACCEPT CORP
PO's. 3% ON VISA,
MC, AM EX. 15 DAY
DOA RETURN/
EXCHANGE POLICY.
FULL MFG
WARRANTY.**



Testing. Testing.



One

Two

Three.

The Graduate Management Admission Council sponsors a series of publications to prepare you for an MBA program.

The Official Guide for GMAT Review. This is the number one review for the Graduate Management Admission Test. It's prepared by the people who develop and administer the test—ETS. And it's the only review that gives you 580 actual—not simulated—test questions.

The Official Guide to MBA Programs. Here are the key facts on more than 500 B-schools. Read this before you send out all those application fees.

The Official Software for GMAT Review.

This specially designed software program is totally self-contained. There's no need to flip to a book. Run sample tests and see your score immediately. Find out why your answers are right or wrong. Software is available for the IBM PC, PS/2 and compatibles. Pick up the books at your bookstore or order by mail. The software is only available by mail. For ordering information call (609) 771-7243.



CIRCLE 229 ON READER SERVICE CARD

Graduate Management Admission Council

Haven't You Heard the News?



You don't have to buy the whole newstand to get copies of your latest article or review. Order customized reprints from Ziff-Davis Publishing Co. and let potential clients read all about it.

To find out how you can have your article or review reprinted, contact Jennifer Locke—Reprints Manager, Ziff-Davis Publishing Company, One Park Ave., New York, NY 10016, 212-503-5447.

*Maximum quantity 500 reprints.

MARKETPLACE

PRODUCT CATEGORIES

HARDWARE

ADD-ON-BOARDS.	373	DISKETTES	377
CD-ROM	373	EXPANSION UNITS	377, 378
CABLES	373	PERIPHERALS	378
COMMUNICATIONS	373	PLOTTERS	378
	374, 375	POWER SUPPLIES	379
COMPUTER SYSTEMS	376	PRINTERS	379
DISK DRIVES	377	SECURITY	379

SOFTWARE

ACCOUNTING	379	MANUFACTURING	384
BUSINESS	379	MEDICAL	384
BUSINESS PROJECT MANAGEMENT	393	MUSIC	385
BUSINESS TIME MANAGEMENT	379	PREVENTATIVE MAINTENANCE	385
COMMUNICATIONS	379	PROGRAMMERS TOOLS	385, 386
CONSTRUCTION	380	PUBLIC DOMAIN	386, 387
DATA BASE	380	REAL ESTATE	387
DATA ENTRY	380	RELIGION	387
DESKTOP PUBLISHING	380	SALES MARKETING	388
EDUCATION	380, 381	SCIENTIFIC	388
ENGINEERING	381	SECURITY	388, 389
ENTERTAINMENT/ GAMES	381, 382	STATISTICS	389
FINANCIAL	382, 383	SURVEYS	389
FLOWCHARTING	383	TAXES	390
GRAPHICS	383	UTILITIES	390, 391
HEALTH	384	WORD PROCESSING	391
INVENTORY	384		
MAILING PROGRAMS	384		

MISCELLANEOUS

ACCESSORIES	391	DATA RECOVERY SERVICES	394
BAR CODING	392, 393	DISK CONVERSION	394
BOOKS/CATALOGUES/ PUBLICATIONS	393	DISKETTE COPY SERVICE	394, 395
BUSINESS PROJECT MANAGEMENT	393	NETWORKING	395
COMPUTER INSURANCE	393	SUPPLIES	395
DATA CONVERSION	393	TRAINING/ TUTORIALS	395

RATES AND INFORMATION

PC Magazine Marketplace is a special economical section for product and service listings.

Listings are grouped by category and sold by column inches. Second color option available.

Standard Directory Listings are also available for a minimum of 4 issues at \$575 per issue (\$2300 total).

For additional information call 212-503-5115.

MARKETPLACE ADVERTISING STAFF

PC Magazine, 3rd floor
One Park Avenue, New York, NY 10016

Group Sales Director
Kathryn J. Cumberlander

Group Sales Manager
Daniel L. Rosensweig

Support Manager
Monica B. Dixon

Sr. Advertising Coordinator
Linda Annis-Lopez

Advertising Coordinator
Wanda D. Brown

Production Director
Anne Brockinton

Production Coordinator
Robert Clark

ACCOUNT MANAGERS

Senior Account Manager
Glenda Campbell (212) 503-5118
NY, GA, PA, VA, DC, OH, AK, WY, MA

Jeanne De Simone (212) 503-5156
TX, MN, WI, AR, NC, IN, RI, DE, SC,
LA, ID, MT, OVERSEAS

Kathleen Morris (212) 503-5176
UT, TN, NB, HI, (CA 94000 & UP)

Kenneth Nova (212) 503-5175
WV, FL, VT, NH, (CA 93996 DOWN)

Michael Brooks (212) 503-5125
MI, CT, IL, KY, ME, OR, OK, AL,
MO, NM, IA

Jonathan Adewumi (212) 503-5117
NJ, WA, MD, AZ, CO, NV, MS, KS,
ND, SD (ALL CANADA)

1-(800) 825-4ADS

MARKETPLACE

HARDWARE/ADD-ON-BOARDS

AT LAST! THE
REAL 386 POWER

Just minutes away!!!! **WARPSPEED/386** CONVERSION SET INCLUDES:

- * 80386/20MHz Motherboard
- * AMI BIOS Installed
- * 1 Mb 80ns DRAM Installed
- * Battery * Installation Guide
- * LANDMARK Setup Software

Complete Price: \$1495

80386/20MHz with 1Mb DRAM \$1595
80286/20MHz with 512K RAM \$895
MC/Visa Accepted-3% Shipping Handling

ORDER LINE: (800) 627-6996

HomeSmart Computing

CIRCLE 581 ON READER SERVICE CARD

Never enter time and date again. dClock II \$49.95 Slotless Clock-Calendar



- Compatible with most computers.
- Easy to install.
- Replaceable battery.
- 30-day money-back guarantee.
- Great gift idea.

To Order (817) 540-0938

Or write to Microcise
2107 West Essex Blvd.
Euless, Texas 76040

Please add \$2.50 for shipping & handling
CIRCLE 584 ON READER SERVICE CARD

COMMUNICATIONS

PC-Hooker

Connect any two IBM compatibles and transfer files back and forth at speeds exceeding 115,000 baud, faster with parallel.

Faster than LapLink Easier than Bridge

- Universal serial cable, parallel optional
- Bi-directional transfers
- Disk/file management, eg. Dirtree, Sort, Find, View
- Text edit and print facility
- Chat mode
- 5 1/4" and 3 1/2" disks
- PS/2 ready

PC-Hooker includes everything you need for fast and easy file transfers for only \$79.95.

PC-Hooker PLUS with Hayes modem support is \$99.95. Do everything in the background with PC-Hooker TSP for \$129.95. For a limited time, get a parallel cable FREE with PLUS and TSP.

AMICA Order today
1-800-888-9455

CIRCLE 586 ON READER SERVICE CARD

NEW! VERS 2.0
BIG MOUTH

REAL VOICE Digital Recording for your PC, XT, AT or Compatible

- ◆ VOICE MAIL SYSTEM
- ◆ TELEMARKETING
Inbound & Outbound
- ◆ SMARTEST ANSWER MACHINE
- ◆ AUTODIAL-DATABASE
- ◆ VOICEPAD™
Voice for your Programs
- ◆ PROGRAMMER'S TOOLKIT (optional) 79%

1/2 card, software, cables, & speaker
\$269.95 - 5 yr. warranty

(415) 652-9600
Talking Technology, Inc.
4362 Piedmont Ave. Suite B
Oakland, CA 94612

CIRCLE 582 ON READER SERVICE CARD

THE X-BANDIT 4 EMS 4

For XT/AT Enhanced, expanded memory utilizing LIM 4.0 specifications. Segmented memory mapping, split memory addressing 2 mb in one slot. 8 mb total. Spooler, RAM disk auto configuration software, manual, warranty all included \$229

TELETEK ENTERPRISES, INC.
4600 Peeli Drive
Sacramento, CA 95838

(916) 927-7684 FAX

CD-ROM

CD-ROM

Drives (ready to run):

- Macintosh Plus/SE \$499
- Toshiba Drive for MAC SE/Plus/II \$51
- PCROM Drive Special - Macintosh SE/Plus \$109
- Portable 286-w/2.0 MBM Drive \$145

Drives/Tools Combos:

- PC System Set (2 drives + Drivers) 799
- Macintosh Programmer's Library + Drive 999
- Chemical Photography + Drive 1219

Titles:

- Comprehensive Papers or Electronic Bible 69
- CD ROM Searchlight 95
- Brooklyn Museum 99
- C Library or Graphics Lab 99
- Chemical Structures or Electronic Statistics 99
- Chemical or Biology (MNC) 109
- PC Sig or Parallel 24
- 247 Data Computer Library (NTR) 405
- Oxford English Dictionary 945

Hundreds of CD-ROM titles, free 188-page catalog
AMICA/MC/Visa

Bureau of Electronic Publishing
18 Louisa Square, Toronto, ON M5G 1A5
(213) 746-3011

CIRCLE 585 ON READER SERVICE CARD

CABLES



PUT YOUR PRINTER UP TO 300' AWAY!

NEW LONG RANGERS' PRINTER
EXTENDER AND BUFFER

- Uses standard 4-wire phone cable with modular plugs, up to 300' (10' cable included)
- Optional 50k (15 pg) or 64k (30 pg) buffer
- No power supply needed
- Works with POSTNET/PS2 parallel
- Guaranteed compatible with all software
- 3-year warranty, 30-day money-back guarantee

LONG RANGER EXTENDER \$119.95
LONG RANGER 50K BUFFER \$159.95
LONG RANGER 64K BUFFER \$199.95

RANGER

RANGER TECHNOLOGIES, INC.
2225 FIRST ST., #118, SAN VALLEY, CA 95066
(805) 583-8847

CIRCLE 586 ON READER SERVICE CARD



Companion allows you to add an extra keyboard and monitor up to 500' from your PC system unit.

* Now available for *
VGA and PS/2.

DEALER PROGRAM AVAILABLE
PRICES START AT \$219.00

CYBEX CORPORATION
2800 H. Rob Wallace Ave.
Huntsville, AL 35805
(205) 534-0011

CIRCLE 587 ON READER SERVICE CARD

CD-ROM



CD-ROM/WORM OUTLET IS YOUR DATA SAFE?

SAVE WITH THIS FANTASTIC OFFER

HITACHI & TOSHIBA DISCOUNTED
BOOKSHELF & CD-ROM DRIVE \$725.00
THE BIBLE LIBRARY I & II, 200 References

Discounted GROLIER'S McGRAW-HILL SCIENCE SUPERSET, PC-GE,
US ATLAS, GROLIER'S AND MORE MERCH.

BUY HITACHI DRIVE GET:
Programmer's Library
Grolier Encyclopedia
Physician's Desk Reference
FOR \$960

CALL ANYTIME 1-800-543-1734 ORDERS ONLY
716) 932-7711 ONE DAY SERVICE C.O.D. ACCEPTED

JASON ENTERPRISE

218 Pine St. Buffalo, N.Y. 14204
CIRCLE 583 ON READER SERVICE CARD

TO PLACE YOUR
AD IN

PC Magazine

Marketplace

Call (212) 503-5115
or (800) 825-4ADS

MARKETPLACE

COMMUNICATIONS



Invisible Network.

- Includes all hardware and software—Nothing extra to buy
- NET-30 Network Operating System is full-featured, has extensive on-line help, and saves memory.
- File sharing, print spooling, file record locking, electronic mail, menu system, security, network management, diskless workstations, diagnostics.
- Also compatible with NETBIOS, IBM PC LAN Program, Novell Network.
- 30-day money-back guarantee and one-year warranty.

	Model 200	Model 300	Model 200 A	Ethernet
Compatibility	IBM PC/XT/AT B Bit	IBM PC/XT/AT B or 16 Bit	Micro Channel 16 Bit	IBM PC/XT/AT B bit
Speed	1.8 Mbps	3.0 Mbps	1.8 Mbps	10.0 Mbps
Wiring	Twisted pair	Twisted pair	Twisted pair	Thin coaxial
Price	\$215.00	\$315.00	\$399.00	\$399.00

For more information call (415) 578-5967 or write
Invisible Software, Inc.,
1165 Chess Drive, Suite 8, Foster City, CA 94024

"Good performance under load, elegant design, low price, simple cabling requirements, and broad compatibility."
—PC Week

"The Invisible Network is a darn good deal."
—PC Magazine

ADD A SECOND USER
to your XT/AT/386

- Two users can work simultaneously under DOS on same or different programs.
- Use any off-the-shelf DOS program.
- SHARE file, data, modem, math co-processor, printer and other peripherals.
- Simple to install, easy to use.



Expand to a maximum of 10 users by adding PCSHAREplus

*Complete monographic workstation or adapter, monitor, keyboard, and software. Based on 2 unit purchase.

ZAKI CORPORATION • 420 Maple St. • Marlboro, MA 01752

CIRCLE 163 ON READER SERVICE CARD

INSTANT SATELLITE NETWORKS

Distributing information via satellite is profitable and cost effective. You can deliver information anywhere in the continental U.S. in seconds to an unlimited number of locations. You control authorization to receive your transmission. S.T.A.R. provides you with everything you need.

S.T.A.R. will help you get started. Call us today at (801) 225-7000

Satellite Technology And Research

530 SOUTH COMMERCE ROAD, OREM, UTAH 84058 FAX (801) 225-1160

CIRCLE 163 ON READER SERVICE CARD

Extender
by cybex

Extend the distance between Monitor Keyboard and System Unit up to 600 ft.

- IBM PC, XT, AT, PS-2 and 100% compatibles
- Available for MDA, CGA, EGA (TTL) and VGA (Analog) Monitors
- 25, 50, 100, 150, 200, 250 ft lengths
- No external power required
- Special orders for any length up to 600 ft
- Prices start at \$150
- One-of-a-kind product

CYBEX CORPORATION

2800 H. Bob Wallace Avenue
Huntsville, AL 35895
(205) 534-0011

CIRCLE 160 ON READER SERVICE CARD

NOBODY DOES

FAX

BETTER

SHARP
MURATA
RICOH
XEROX

Factory Warranty
Immediate Delivery
CALL NOW

Full Training
Installation
Low Discount Prices

FAX OF AMERICA

America's Low Price
FAX Distributor

1-800-342-3299

IND. Call 219-256-7019

CIRCLE 161 ON READER SERVICE CARD

PC
MAGAZINE

FACT FILE

Get The Word Out!

Your Product Has Been Chosen EDITOR'S CHOICE.

Let us take your article to its highest level of marketing potential with a reprint!

To find out how you can have your article or review elegantly reprinted** on 80 lb. paper stock, in 4-color, 2-color or 1-color, call or write today:

Jennifer Locke—Reprints Manager,
Ziff-Davis Publishing Company,
One Park Avenue, New York, NY 10016, 212-503-5447

**Minimum quantity 500 reprints.

MARKETPLACE

TOSHIBA LAPTOPS FAX \$385

COMPUTERS, PRINTERS, Low Low \$\$

TOSHIBA LAPTOPS

T-1000	.....	\$779
T-1200 F 2 FLOPPY	.....	\$1299
T-1200 FB	.....	\$1499
T-1200 H 20 MB hrd	.....	\$2189
T-1200 HB 20 MB hrd	.....	\$2295
T-1600-286 + 20MB	.....	\$3099
T-3100E-286 + 20MB	.....	\$2895
T-3200-286-40MB	.....	\$3495
T-5100-386-40MB	.....	\$4495
T-5200/40MB	.....	CALL
T-5200/100MB	.....	CALL

ZENITH LAPTOPS

Supersport Model 2	.....	\$1495
Supersport Model 20	.....	\$2295
" 286/ 20	.....	\$3099
" 386/40	.....	\$3495
Turbosport 386/40	.....	\$4995
Turbosport 386/40	.....	\$5329

EPSON PRINTERS

LX-800	.....	\$195
LQ-500	.....	\$335
LQ-850	.....	\$545
LQ-1050	.....	CALL
LQ-2550	.....	\$945
FX-850	.....	\$395
FX-1050	.....	\$525
EX-800	.....	\$449
DFX-5000	.....	\$1345

PANASONIC PRINTERS

KXP-1081	.....	\$179
KXP-1091I	.....	\$199
KXP-1124	.....	\$325
KXP1592	.....	\$395
KXP-1595	.....	\$475

TOSHIBA PRINTERS

P321SL	.....	\$482
P321 SLC	.....	\$549
P321SL	.....	\$575
P351 SX	.....	\$895
EXPWRTR 311	.....	\$395



FAX MACHINES

XEROX 455 REMFG	..	\$385
NISSIE 303	.....	\$595
HARRIS 3M REMFG	..	\$575
MURATA 1200	.....	\$645
MURATA 1600	.....	\$745
RICOH RF800	.....	\$755
RICOH FAX 10	.....	\$1165
RICOH FAX 20	.....	\$1395
RICOH FAX 35	.....	\$1655
RICOH FAX 60	.....	\$1695
RICOH FAX 70	.....	\$2285
CANON FAX 8	.....	\$745
CANON FAX 20	.....	\$1045
CANON FAX 25	.....	\$1575
PANAFAX UF155	.....	\$955
PANAFAX UF150	.....	\$995
PANAFAX UF 250	.....	\$1395
PANAFAX UF 260	.....	\$1595
PANASONIC KXF 120	.....	\$995
SANYO SF100	.....	\$875
SANYO SF 200	.....	\$1045
SANYO SF 515 H	.....	\$1370
SANYO SF 725	.....	\$2495
SHARP FO 220	.....	\$865
SHARP FO 300	.....	\$1095
SHARP FO 420	.....	\$1175
SHARP UX 180	.....	\$865
SHARP UX 350	.....	\$1175
TOSHIBA TF 211	.....	\$1375

FAX PAPER

TYPE	MODELS	PRICE
98P6	96' Rolls, 6/CTN	.....\$22
164P6	164' Rolls, 6/CTN	.....\$32
328P8	328' Rolls, 6/CTN	.....\$69

COPIERS

SANYO SFT 600	.....	\$399
SANYO SFT 805	.....	\$599

SHARP COPIERS

Z50	.....	\$545
Z55	.....	\$645
Z70	.....	\$755

CANNON COPIERS

PC-7	.....	\$1175
PC-6RE	.....	\$975

H.P. PRINTERS

LASER JET II	.....	\$1695
DESK JET	.....	\$725
PANSONIC 4450	.....	\$1450

Terms: These are Prepay Prices, C.O.D. + 2%, VISA/MC + 2%, Restocking 20%. Accept Cashiers Check.

1 - 8 0 0 - 3 8 3 - 3 1 9 9

T.P.C. 12603 Hoover St. • Garden Grove, CA 92641 • FAX 891-1202

CIRCLE 364 ON READER SERVICE CARD

MARKETPLACE

COMPUTER SYSTEMS

BEST DEAL IN U.S.A.!

LOGITECH PS BUS MOUSE
3 button, generic bus card, &
software driver. **FREE CAD**
program! **\$35 10+ \$30!**

12" VGA MONITOR \$349!
Quality of AMDEK VGA at a
fabulous AGE price... Limited!

FLUITSU ESDI 73MEG \$395!
Model 2044L, 20M/s access time!!
Twice the data transfer as MFM drive!
Great for LAN, CAD, 386! What a Deal!
ESDI HD/FLOPPY Controller **\$179**

MONO 386 SYSTEM, 73MEG
Unitron 386, 16MHz, 1meg RAM, Am-
ber monitor, enhanced KII, 73MEG
ESDI hard drive **ONLY \$1895!**

TRACKBALL/KEYBD COMBO
Toshiba/KEYBD Combo Unit, FREE D-
Hand software **200 VALUE \$119.00**
24 HOUR ORDER LINE
(800) 452-4455 ext 1132
In CA Call (800) 452-4455 ext 1132
SYSTEM MASTERS VISAMCOCO

CIRCLE 568 ON READER SERVICE CARD

AVOID THE HASSLE & THE RISK!

1-800-GO TO PRC

GREAT PRICES
For example:
10 MHz AT 640K VGA System
\$1425

Highest Quality Components
Knowledgeable & Courteous Personnel
Full Line Computers & Peripherals in Stock

Get it all at
PRC Technology Inc.
9450 Teller Ave. #1
El Monte, California 91731
IN CALIFORNIA, CALL: 1-818-350-8870

CIRCLE 568 ON READER SERVICE CARD

THE GIANT SLAYERS

- 2 80386 24MHz \$1199 4.5 20.5
- 5 1MB 256K 0.1MS Memory (no 10MB)
- 5 1.2MB Floppy Drive
- 5 40MB 20M/s Hard Drive
- 5 512 Interface Controller
- 5 Super & Parallel Ports
- 5 80287 24MHz & 80285 Sockets
- 5 Server Cases with 200W Power Supply
- 5 Enhanced - 101 Keyboard
- 5 One Yr. warranty Parts & Labor
- 5 Options: 40MB to 320MB Floppy, 387 Video etc

ESC386-20MHz-80MB \$2195!

ESC Computers, Inc.
445 N. La Brea Ave.
(A. CA 90048)
Fax: (213) 655-3605
VISA MC
Phone: (213) 655-8945

CIRCLE 567 ON READER SERVICE CARD



- Phoenix BIOS
 - 12 or 16 MHz, 0 wait states
 - Expandable to 1 megabyte
 - On board clock and calendar
 - Digital speed display
 - Hardware reset & turbo sw.
 - 5-Dr. capacity with 3-Dr. open
 - 200 watt power supply
- 12 MHz 16 MHz
Rare Bene 490.00 645.00
- Come with:
■ Zero K RAM
■ 1.2M floppy drive
■ Floppy/HDD drive
■ 101-key keyboard
- 770.00 925.00**

JAWIN COMPUTER PRODUCTS
We stock over 100 items of peripheral
cards, please write for our price list.

CIRCLE 569 ON READER SERVICE CARD

IBM PS/2's

Up to 41% off!

Model	Retail	Your Cost
MODEL 50-021	3,595	\$2,350
MODEL 60-041	5,295	3,245
MODEL 60-071	5,795	3,675
MODEL 80-041	6,995	4,285
MODEL 80-071	7,995	4,825
MODEL 80-111	8,995	5,945
MODEL 80-311	11,995	8,345

American Video Computer Center
2890 Griffin Road, Suite #4
Ft. Lauderdale, FL 33312
(305) 985-9406

CIRCLE 569 ON READER SERVICE CARD

Computer Systems-Disk Drives

8088 sys	640K 20MB CGA	\$1066
286 sys	640K 40MB EGA	\$1709
386 sys	1MB 80MB HD VGA	\$3295
TIGERROAD 286 upgrade XT		\$209
SEAGATE 51251 40MB HD		\$333
SDNY 3 5" F Drive 720K		\$84
SDNY 3 5" F Drive 1.4MB		\$89
FLUITSU 5 25" F Drive 350K		\$57
FLUITSU 5 25" F Drive 1.2MB		\$79
DRCHD Pro-Design 512K VGA		\$425
NANAD 16" Flexcan 90705		\$1075

DMC
1254 South St. Long Beach, CA 90805
Tel: (213) 422-4444
Fax: (213) 422-7676

CIRCLE 571 ON READER SERVICE CARD

MYLEX	PERFORMANCE NETWORKS	Mapdor	Seagate
MO386-16 1MB 64K cache \$1195	ST1088 72MB 27ms \$980	ST 275 \$199 \$37	\$258
XT386-16 1MB 64K cache \$1195	ST1148 120MB 27ms \$1245	ST200 218 \$37	\$316
MB386-16 1MB 64K cache \$1195	ST2798 288MB 27ms \$2795	ST 155 218 \$37	\$275
MB386-20 1MB 64K cache \$1695	ST2838 320MB 27ms \$2835	ST 138 275 \$37	\$295
MB386-25 1MB 128K cache \$1695	ST2878 360MB 27ms \$2875	ST 155 275 \$37	\$325
MA286-12 0.6 512K \$295 495	ST2918 400MB 27ms \$2915	ST 155 275 \$37	\$375
MA286-16 0.6 512K \$495 695	ST2958 440MB 27ms \$2955	ST 155 275 \$37	\$375
MYLEX SYSTEMS	ST2998 480MB 27ms \$2995	ST 155 275 \$37	\$375

CIRCLE 571 ON READER SERVICE CARD

LAPTOP SPECIALS

ZENITH • TOSHIBA • NEC
• SHARP • DATAVUE

The Latest Laptops at Low Prices
along with a wide Selection of
Accessories including . . .

- 8 1/2" or 3 1/2" Ext. and Int. Drive
- New Tandy 1400 LT and Toshiba
- 386+ • Internal Hard Drive
- Upgrades.
- 1200 and 2400 Baud Modems.
- Discus Printers and Numeric Key-
boards For Laptops
- Penets and Sharp Fax Machines
- For Fast Reliable Service Call

COMPUTER OPTIONS
UNLIMITED
201-489-7678 • 7 Days
9AM-10PM (EST)

CIRCLE 572 ON READER SERVICE CARD

\$1713 386/25MHz
CALL TODAY! 1-800-999-2807

Complete System with IBM-DS, HD, 1.2MB D, 287/387 socket.
100% Compatible, No Tricks, No Hidden cost!

LOWEST PRICES FOR:
1:1 HD, VGA, 286/12, 286/16, 386/20
COMPATIBLE WITH OS/2 AND ALL MAJOR NETWORKS.
FULL TECH. SUPPORT & CUSTOMER SERVICE.

CAPITAL COMPUTERS INC. SINCE 1980
CIRCLE 574 ON READER SERVICE CARD

LAND THE BIG ONE!



Expect more than a few nibbles this season from
clients and distributors. Ziff-Davis reprints are
custom-designed and will make your product's review
an attractive marketing lure.

If you're looking to land the big one this season,
contact Jennifer Locke—Reprints Manager, Ziff-Davis
Publishing Co., One Park Ave., NY, NY 10016, (212) 503-5447, or on MCI Mail (Min. order 500 reprints.)

THE SHOWCASE FOR PRODUCTS AND
SERVICES IN THE MS DOS MARKET . . .

MARKETPLACE

DISK DRIVES

SPECIAL REPAIR COUPON

Capacity	Flat Rate	SPECIAL	VALID THROUGH 5/15/89
10-19mb	\$99	\$89.10	We repair most major brands
20-30mb	\$125	\$112.50	FLOPPY DRIVE REPAIRS
31-40mb	\$150	\$135.00	FLAT RATE ONLY \$45
41-49mb	\$175	\$157.50	90 day warranty on all repairs.
50-85mb	\$210	\$189.00	5 day turn-around time.
86-120mb	\$275	\$247.50	jb TECHNOLOGIES, INC.
121-150mb	\$325	\$292.50	21011 Rasca St. #F
Test & Eval.	\$25		Chatsworth, CA 91311
			Telephone (818) 709-8400

CIRCLE 575 ON READER SERVICE CARD

DISKETTES

BUY QUALITY FOR LESS! BULK DISKS & TAPES

**100% CERTIFIED
LIFETIME WARRANTY**

MAXELL	DYSAN	SONY
5 1/4" DS/DD 59¢	5 1/4" DS/DD 39¢	QD2000 15.91
3 1/2" DS/DD 1.09	5 1/4" DS/HD 89¢	QD300XLP 17.84
Bulk disks: Min. qty. 300. With Tyvek sleeves & label kits.		QD600A 19.53
		Tapes: 5 per box, 4 box min.

In NJ 201-462-7628 **800-222-0490** FAX: 201-462-5658

• 24 Hour Shipment •



MEGAsoft



P.O. Box 710, Freehold, NJ 07728

CIRCLE 577 ON READER SERVICE CARD

DISKETTES

**Why waste your time
formatting disks?**

**Preformatted disks
save you time and money!**

Memorex • Nashua • 3M

5 1/4" (from 48¢) • 5 1/4" HD • 3 1/2" • 3 1/2" HC

Call toll-free TODAY!

1-800-321-4668

In Colorado (303) 423-0371. Open 8:00 to 5:30
Mountain Time, Monday—Friday.

ALF SEE US AT COMDEX BOOTH 7361

ALF Products, 3940 Youngfield St., Wheat Ridge, Co. 80033

CIRCLE 576 ON READER SERVICE CARD

EXPANSION UNITS

Name Brands • Low \$\$

EXPANSION BOARDS	
AST Sispackplus (84-384k)	\$129
Advantage (128k-1.5M)	\$249
Advantage2 386 for PS2 80 W/Ok\$429	
Rampage 286 Plus (Ok-8M)	\$399
Rampage2 286 for PS2 500K	\$349
Intel Above 286 Plus (512k-2M)	\$189
Above 286 Plus (512k-2M)	\$479
Above Board 2 PlusPS2 (Ok-2M)	\$299
Inboard 386 PC (1M) \$Call.AT (Ok)\$949	
Quadboard (0-384k)	\$129
GRAPHICS CARDS	
HERCULES Mono: \$189; ATI VIP: \$289	
QUAD Prosync: \$Call; VEGA VGAS299	
HARD DRIVES	
SEAGATE Kits from 20mb	\$299
MINISCRIBE Kits from 20mb	\$299
PLUS Hard cards...from	\$519
MEMORY64k, 256k, 1MB, SimmaModules\$Call	
FLOPPY DRIVES; Toshiba for	
PC: AT: \$89.1; 2MB, \$99.3; 3.5"	\$99
External 5-1/4" drives for PS2	\$Call
COMPUTERS, AST, SAMSUNG	
Tape Backup, Maynard, Everex	

VLM Computer Electronics
10 Park Place, Morristown, NJ 07960
(201) 267-3266/Visa, MC, Check or COD

DYNAMIC RAMS

SIMM	80/100	\$CALL
1MBIT	100ns	\$24.00
514256	100ns	\$27.00
41464	100ns	\$ 9.95
41256	100ns	\$ 9.25
41256	100ns	\$ 8.05
41258	100ns	\$ 9.95
41464	100ns	\$ 2.85

PROCESSORS		PC PROMS		
80387-25	25pin	\$25.00	27C101 2501A	\$ 4.00
80387-30	30pin	\$45.00	27C117 2501A	\$ 1.00
80387-16	16pin	\$35.00	27V13 2501A	\$ 5.00
80387-12	12pin	\$25.00	27C206 2501A	\$ 5.00
80287-10	10pin	\$24.00	27206 2501A	\$ 4.00
80387-8	8pin	\$22.00	27C38A 2501A	\$ 4.00
8047-1	10pin	\$179.00	27C38A 3001A	\$ 4.00
80387-3	3pin	\$135.00	27494 2501A	\$ 3.00
V-30	30pin	\$ 12.75	*E-RAMS	
V-60	60pin	\$5.50/15	43256 100pin	\$ 8.00
			43256 100pin	\$ 8.00

I.C. EXPRESS

13200 Valley Blvd. City of Industry, CA 91714 Tel: 818-309-2944
(800) 862-8888 • (800) 862-8181

CIRCLE 579 ON READER SERVICE CARD

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/Display Ad format represents a fast, easy and cost-effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4485

D-RAMS
64-128 PULL
\$1.25 & MORE

MEMORY
256-1024 PULL
\$1.95 & MORE

Intel
80386
80387

ITC CORP

ZIPP
SIPP
1 MEG
64kx4

14-730-1121
14317A-730-2627
2630 Walnut Ave.
Suite 100
Tustin, CA 92680

CIRCLE 580 ON READER SERVICE CARD

MARKETPLACE

EXPANSION UNITS

IC's PROMPT DELIVERY!!!
SAME DAY SHIPPING USUALLY!!
QUANTITY PRICES VARY FROM \$7.99 TO \$19.99

OUTSIDE OKLAHOMA NO SALES TAX

DYNAMIC RAM	
SIMM 72	80 ns \$650.00
SIMM 72	100 ns \$370.00
SIMM 160	80 ns \$150.00
SIMM 160	100 ns \$150.00
SIMM 160	120 ns \$150.00
SIMM 160	150 ns \$150.00
SIMM 160	180 ns \$150.00
SIMM 160	200 ns \$150.00
SIMM 160	250 ns \$150.00
SIMM 160	300 ns \$150.00
SIMM 160	350 ns \$150.00
SIMM 160	400 ns \$150.00
SIMM 160	450 ns \$150.00
SIMM 160	500 ns \$150.00
SIMM 160	550 ns \$150.00
SIMM 160	600 ns \$150.00
SIMM 160	650 ns \$150.00
SIMM 160	700 ns \$150.00
SIMM 160	750 ns \$150.00
SIMM 160	800 ns \$150.00
SIMM 160	850 ns \$150.00
SIMM 160	900 ns \$150.00
SIMM 160	950 ns \$150.00
SIMM 160	1000 ns \$150.00
SIMM 160	1050 ns \$150.00
SIMM 160	1100 ns \$150.00
SIMM 160	1150 ns \$150.00
SIMM 160	1200 ns \$150.00
SIMM 160	1250 ns \$150.00
SIMM 160	1300 ns \$150.00
SIMM 160	1350 ns \$150.00
SIMM 160	1400 ns \$150.00
SIMM 160	1450 ns \$150.00
SIMM 160	1500 ns \$150.00
SIMM 160	1550 ns \$150.00
SIMM 160	1600 ns \$150.00
SIMM 160	1650 ns \$150.00
SIMM 160	1700 ns \$150.00
SIMM 160	1750 ns \$150.00
SIMM 160	1800 ns \$150.00
SIMM 160	1850 ns \$150.00
SIMM 160	1900 ns \$150.00
SIMM 160	1950 ns \$150.00
SIMM 160	2000 ns \$150.00
SIMM 160	2050 ns \$150.00
SIMM 160	2100 ns \$150.00
SIMM 160	2150 ns \$150.00
SIMM 160	2200 ns \$150.00
SIMM 160	2250 ns \$150.00
SIMM 160	2300 ns \$150.00
SIMM 160	2350 ns \$150.00
SIMM 160	2400 ns \$150.00
SIMM 160	2450 ns \$150.00
SIMM 160	2500 ns \$150.00
SIMM 160	2550 ns \$150.00
SIMM 160	2600 ns \$150.00
SIMM 160	2650 ns \$150.00
SIMM 160	2700 ns \$150.00
SIMM 160	2750 ns \$150.00
SIMM 160	2800 ns \$150.00
SIMM 160	2850 ns \$150.00
SIMM 160	2900 ns \$150.00
SIMM 160	2950 ns \$150.00
SIMM 160	3000 ns \$150.00
SIMM 160	3050 ns \$150.00
SIMM 160	3100 ns \$150.00
SIMM 160	3150 ns \$150.00
SIMM 160	3200 ns \$150.00
SIMM 160	3250 ns \$150.00
SIMM 160	3300 ns \$150.00
SIMM 160	3350 ns \$150.00
SIMM 160	3400 ns \$150.00
SIMM 160	3450 ns \$150.00
SIMM 160	3500 ns \$150.00
SIMM 160	3550 ns \$150.00
SIMM 160	3600 ns \$150.00
SIMM 160	3650 ns \$150.00
SIMM 160	3700 ns \$150.00
SIMM 160	3750 ns \$150.00
SIMM 160	3800 ns \$150.00
SIMM 160	3850 ns \$150.00
SIMM 160	3900 ns \$150.00
SIMM 160	3950 ns \$150.00
SIMM 160	4000 ns \$150.00
SIMM 160	4050 ns \$150.00
SIMM 160	4100 ns \$150.00
SIMM 160	4150 ns \$150.00
SIMM 160	4200 ns \$150.00
SIMM 160	4250 ns \$150.00
SIMM 160	4300 ns \$150.00
SIMM 160	4350 ns \$150.00
SIMM 160	4400 ns \$150.00
SIMM 160	4450 ns \$150.00
SIMM 160	4500 ns \$150.00
SIMM 160	4550 ns \$150.00
SIMM 160	4600 ns \$150.00
SIMM 160	4650 ns \$150.00
SIMM 160	4700 ns \$150.00
SIMM 160	4750 ns \$150.00
SIMM 160	4800 ns \$150.00
SIMM 160	4850 ns \$150.00
SIMM 160	4900 ns \$150.00
SIMM 160	4950 ns \$150.00
SIMM 160	5000 ns \$150.00
SIMM 160	5050 ns \$150.00
SIMM 160	5100 ns \$150.00
SIMM 160	5150 ns \$150.00
SIMM 160	5200 ns \$150.00
SIMM 160	5250 ns \$150.00
SIMM 160	5300 ns \$150.00
SIMM 160	5350 ns \$150.00
SIMM 160	5400 ns \$150.00
SIMM 160	5450 ns \$150.00
SIMM 160	5500 ns \$150.00
SIMM 160	5550 ns \$150.00
SIMM 160	5600 ns \$150.00
SIMM 160	5650 ns \$150.00
SIMM 160	5700 ns \$150.00
SIMM 160	5750 ns \$150.00
SIMM 160	5800 ns \$150.00
SIMM 160	5850 ns \$150.00
SIMM 160	5900 ns \$150.00
SIMM 160	5950 ns \$150.00
SIMM 160	6000 ns \$150.00
SIMM 160	6050 ns \$150.00
SIMM 160	6100 ns \$150.00
SIMM 160	6150 ns \$150.00
SIMM 160	6200 ns \$150.00
SIMM 160	6250 ns \$150.00
SIMM 160	6300 ns \$150.00
SIMM 160	6350 ns \$150.00
SIMM 160	6400 ns \$150.00
SIMM 160	6450 ns \$150.00
SIMM 160	6500 ns \$150.00
SIMM 160	6550 ns \$150.00
SIMM 160	6600 ns \$150.00
SIMM 160	6650 ns \$150.00
SIMM 160	6700 ns \$150.00
SIMM 160	6750 ns \$150.00
SIMM 160	6800 ns \$150.00
SIMM 160	6850 ns \$150.00
SIMM 160	6900 ns \$150.00
SIMM 160	6950 ns \$150.00
SIMM 160	7000 ns \$150.00
SIMM 160	7050 ns \$150.00
SIMM 160	7100 ns \$150.00
SIMM 160	7150 ns \$150.00
SIMM 160	7200 ns \$150.00
SIMM 160	7250 ns \$150.00
SIMM 160	7300 ns \$150.00
SIMM 160	7350 ns \$150.00
SIMM 160	7400 ns \$150.00
SIMM 160	7450 ns \$150.00
SIMM 160	7500 ns \$150.00
SIMM 160	7550 ns \$150.00
SIMM 160	7600 ns \$150.00
SIMM 160	7650 ns \$150.00
SIMM 160	7700 ns \$150.00
SIMM 160	7750 ns \$150.00
SIMM 160	7800 ns \$150.00
SIMM 160	7850 ns \$150.00
SIMM 160	7900 ns \$150.00
SIMM 160	7950 ns \$150.00
SIMM 160	8000 ns \$150.00
SIMM 160	8050 ns \$150.00
SIMM 160	8100 ns \$150.00
SIMM 160	8150 ns \$150.00
SIMM 160	8200 ns \$150.00
SIMM 160	8250 ns \$150.00
SIMM 160	8300 ns \$150.00
SIMM 160	8350 ns \$150.00
SIMM 160	8400 ns \$150.00
SIMM 160	8450 ns \$150.00
SIMM 160	8500 ns \$150.00
SIMM 160	8550 ns \$150.00
SIMM 160	8600 ns \$150.00
SIMM 160	8650 ns \$150.00
SIMM 160	8700 ns \$150.00
SIMM 160	8750 ns \$150.00
SIMM 160	8800 ns \$150.00
SIMM 160	8850 ns \$150.00
SIMM 160	8900 ns \$150.00
SIMM 160	8950 ns \$150.00
SIMM 160	9000 ns \$150.00
SIMM 160	9050 ns \$150.00
SIMM 160	9100 ns \$150.00
SIMM 160	9150 ns \$150.00
SIMM 160	9200 ns \$150.00
SIMM 160	9250 ns \$150.00
SIMM 160	9300 ns \$150.00
SIMM 160	9350 ns \$150.00
SIMM 160	9400 ns \$150.00
SIMM 160	9450 ns \$150.00
SIMM 160	9500 ns \$150.00
SIMM 160	9550 ns \$150.00
SIMM 160	9600 ns \$150.00
SIMM 160	9650 ns \$150.00
SIMM 160	9700 ns \$150.00
SIMM 160	9750 ns \$150.00
SIMM 160	9800 ns \$150.00
SIMM 160	9850 ns \$150.00
SIMM 160	9900 ns \$150.00
SIMM 160	9950 ns \$150.00
SIMM 160	10000 ns \$150.00

OPEN 5 DAYS, 7 am to 10 pm S-H-VIA FED-EX ON SAT.

NO EXPORT ONLY US AVAILABLE. QUANT. PRICES VARY. NO CASH/NO CREDIT.

ALL NEW/REF. EQUIPMENT. PRICES VARY. NO CASH/NO CREDIT.

RECEIVED BY: (918) 267-4961

CIRCLE 581 ON READER SERVICE CARD

CALL DRAM CO.

- Lowest Price in Market
- Volume Discounts
- 100% Guaranteed

Dynamic RAM

1M 120NS, 180NS, DRP & 90J
256K 120NS, 120NS, 180NS & 90NS
64K 150NS, & 120NS

Policy: Price subject to change
Min. order \$20, MC VISA add 4%
CA residents add 6.5% sales tax
UPS, Ground \$6. air \$7 (1 lb)
Call for lowest price in the market
(415) 398-2987
Open M-F 9-6
P.O. Box 590127, SF, CA 94159-0127

CIRCLE 582 ON READER SERVICE CARD

PERIPHERALS

SAVE ON

9 TRACK TAPE SYSTEM

FOR IBM PC XT AT



- Mainframe to PC Data Transfer
- High Speed Backup
- All Software, Complete System
- Service and Support, easy installation

call (818) 343-6505 or write to:
Contech Computer Corp.
P.O. Box 153, Tazewell, VA, 22651

CONTECH

CIRCLE 583 ON READER SERVICE CARD

PERIPHERALS

9-TRACK TAPE SYSTEMS!



OVERLAND DATA IS THE EXPERT when it comes to connecting your PC to the mainframe and mini computer world. **OUR ENGINEERS DESIGNED** the most successful tape drives in use today.

- PC/XT/AT/386/PS2/compatibles
- 800, 1600, 3200, 6250 BPI
- Free tutorial on tape systems
- Fastest tape subsystems available
- EBCDIC/ASCII conversion
- IBM & ANSI labeled tapes
- DOS, XENIX, UNIX, PICK
- Highest quality customer service
- Quick delivery
- Software tools supplied
- Stock full range of tape drives
- Network backup and more!

Overland Data Inc.
5620 Kearny Mesa Rd.
San Diego, CA 92111
Tel: (619) 571-5555 • FAX: (619) 571-0982

CIRCLE 584 ON READER SERVICE CARD

9-Track Tape Subsystem



MINISTREAMER™


Now you can exchange data files between your IBM PC/XT/AT and any mainframe or mini-computer using IBM compatible 1600 or 6250 BPI 9-Track tape. Unit can also be used for disk backup. Transfer rate is up to 4 megabytes per minute on PCs and compatibles. Subsystems include 7" or 10 1/2" streaming tape drive, tape coupler card, cables and software.

QUALSTAR™

9621 Irondale Avenue
Chatsworth, CA 91311
Telephone: (818) 882-5822

CIRCLE 585 ON READER SERVICE CARD

CONNECT!



9-TRACK TAPE

- Complete system manufacturer
- Support PC/XT/AT/PS2 & Mac
- Read & write 800/1600/6250
- Use with IBM, DEC, HP tapes
- Links to FORTRAN, C, COBOL
- Networking capability
- Customized software available
- Powerful data extraction
- Large inventory of Anritsu, Cipher, Kennedy, Qualstar
- Fast technical support
- System prices from \$2995

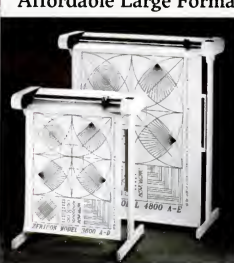
AVOID THE MIDDLEMAN—GO DIRECT!

FLAGSTAFF ENGINEERING 602-779-3341
FAX 779-5998

CIRCLE 586 ON READER SERVICE CARD

PLOTTERS

Affordable Large Format Plotting



C-D \$1695
(Sugg. ret. \$2295)

A-D \$2295
(Sugg. ret. \$2995)

A-E \$2695
(Sugg. ret. \$2995)

Made in USA

Features that say value...

- Economical! \$1,000 less than other large format plotters.
- Compatible! Operates with all popular CAD software supporting DM-PL.
- Multiple Media Sizes as small as 8 1/2" x 11" or as large as 36" x 48" eliminates the need for a second plotter.
- Practical speed you can really use: 10" per second assures good drawing throughput while optimizing the speed at which most plotter pens can draw without skipping.

Reliability and Resolution: 804 assures quality suitable for the most demanding applications including PCB artwork.

Vacuum Paper Hold Down guarantees perfect registration.

CALL NOW AND WE'LL SEND YOU A FREE SAMPLE PLAT.

(415) 490-8380

Dealer inquiries invited

ZERICON
10491 Encyclopaedia Circle, Fremont, CA 94538

DM-PL is a trademark of Houston Instruments

CIRCLE 588 ON READER SERVICE CARD

MARKETPLACE

CONSTRUCTION

CONSTRUCTION ACCOUNTING

Comprehensive, affordable software for builders and contractors. Job cost, billing and draws, payables, check writing, purchase orders, discount and retention tracking, all in one package. \$795. Reviewed and approved by National Assn of Home Builders. Also available: General Accounting and Payroll. YARDI SYSTEMS, INC. 813 Reddick Street Santa Barbara, CA 93103 805-966-3666

DATA BASE

ROOTS III FOR GENEALOGY

Organize your family tree and print camera-ready family books containing charts, lists and indexes. Store, retrieve and display 1,000's of family facts with biographical sketches and source documentation. Lightning-fast searches and sorts. 750 page manual. Satisfaction guaranteed. Write for free brochure. \$250 (+ C tax). COMMSOFT 2257 Old Middlefield Way, Ste A Mountain View, CA 94043 415-967-1900 800-327-6687

FAX PHONE DIRECTORY ON DISK

More than 150,000 entries available containing organization name, city, zip, industry code and FAX number. Rates based on volume ordered. Customized groups by city, zip or industry available. For information contact: HAMILTON WORLD COMMUNICATIONS P.O. Box 977 Trenton, NJ 08650 FAX (609) 584-0048

dBASE III PLUS Workalike Free Trial, Send No Money

PC MAGAZINE MAY 17, 88 said, "1 on 1 is a programmable relational DBMS... faster operation in the interactive mode... the menu mode is a lancer and more complete version of dBASE's Assistant mode... 1 on 1 is 3!! It is a great deal for those who would be glad to have a dBASE III PLUS clone!"

FREE 30 day trial full program. (USA only) just write, or buy now, money back guarantee. Call 203-375-0214 888-435-4343 ext. 405

1 on 1 Computer Systems, Inc. 26 Finchwood Drive Trumbull, CT 06611

gBASE III PLUS is a trademark of Ashton-Tate

CIRCLE 593 ON READER SERVICE CARD

TO PLACE YOUR
AD IN
PC Magazine
Marketplace
Call (212) 503-5115
or (800) 825-4ADS

DATA ENTRY

DATA ENTRY EMULATOR

Runs on Stand-alone or networked PC's, compatibles or PS/2's. You will not find any Data Entry System FASTER, EASIER to use, or LOADED with more USABLE features. Distribution Worldwide. Imbedded rev-10 key option. Fully menu driven. A complete edit language included. Call for our free 30 day trial period. Price \$395. available for IBM AS/400 & S/36



COMPUTER KEYES
21929 Mahah Rd.
Woodway, WA 98020
TEL: 206-776-6443
FAX: 206-777-7210
USA: 800/356-0203

CIRCLE 595 ON READER SERVICE CARD

PC Magazine
Marketplace
2nd Color
Option Available

Everyone is talking about RODE/PC from DPX

DATA ENTRY

"We evaluated all of the PC-based data entry systems: RODE/PC and the 1471 organization from stand-out as clearly superior."

—Computer Manufacturer

Six of the ten largest companies in the U.S. have selected RODE/PC. Call for your evaluation copy today.



DPX
20823 Meyers Creek Blvd
Suite 150 P
Cupertino, CA 95014
(408) 973-9292

CIRCLE 594 ON READER SERVICE CARD

KeyEntry III

Using dedicated, on-line or older systems? Let KeyEntry III, the most widely used system in THE WORLD, show you the full potential of PC-based data entry. UNMATCHED features and capabilities. Supports networked and stand-alone PCs. Call today for complete Evaluation Package!

Southern Computer Systems, Inc.
2732 Seventh Avenue South
Birmingham, AL 35233
(800) 533-6879 or (205) 251 2985

VDE—Viking Data Entry

The premier data entry system. Full-featured to replace key punch & keydisks. Full screen "FORMS," double-key verify, wide variety of options, crosslinks, subtotals, batch balancing, duplicating, statistics, shipping, etc. Character, field & record level validations. \$120-600. Also for minis.

VIKING SOFTWARE SYSTEMS, INC.
2815 East Skelly Drive, Suite 816
Tulsa, Oklahoma 74105
(918) 745-6550

DESK TOP PUBLISHING

We don't do newsletters

But if you're doing, 1,000-page technical documents, we're the best—automated, style-sheet-driven, sophisticated pagination slick publishing features, and camera-ready output.

GML/PC™

The technical documentation and specifications specialist.

Command Technology Corporation, 1900 Mountain Blvd., Oakland, CA 94611
Telephone (415) 339-3530 Telex: 599330 COMMAND TECH
CIRCLE 596 ON READER SERVICE CARD

Trainable OCR

Read printed
pages into
text files!



SPOT can be trained to recognize 1000's of typefaces in over 130 languages.

SPOT OCR Text Reader

Fast, Accurate, Low-Cost OCR. Works with most PCs & scanners.

Flagstaff Engineering

1120 Kaibab, Flagstaff, AZ 86001
(602) 779-3341 FAX (602) 779-5998

CIRCLE 597 ON READER SERVICE CARD

Desktop Publishers!

when you need the best tools for
Screen Capture
and Image Management:

Collage Plus™
Publishing Utilities

Accurate, super-fast grayscale, image browsing within your applications, capture preview, LHM EMS 4.0 support, and much more!
Supports EGA, VGA, Hercules, CGA, MDA adapters. Suggested retail price, only \$99.95

inner media, inc.

(803) 465-3216 Voice, 7195 Fax, Visa, MC, Am Exp.

CIRCLE 598 ON READER SERVICE CARD

Optical Character Recognition (OCR)

PC-OCR™ software converts printed/typed documents into editable text files for your desktop publishing system. Supports HP ScanJet, Canon, Panasonic and most other desktop scanners. Pre-trained for many popular fonts and trainable to read virtually any typestyle, incl. foreign fonts. Reads proportional text, matrix printer output and Xerox copies. \$385. Check/AMEX/Visa/MC/COO Essex Publishing Co. P.O. Box 391 Cedar Grove, NJ 07009 (201) 783-6940

EDUCATION

WRITING ABOUT COMPUTERS

A book on a disk you can read with software. Requires a PC, XT, or AT with 128k memory. \$29.95*

*Ariz. res. add s/tax

Send check or money order to

Maynard Desktop Publishers, Inc.
P. O. Box 82070
Phoenix, Arizona
85071-2070

602/993-1934

CIRCLE 599 ON READER SERVICE CARD

B.Sc. DEGREE IN PROGRAMMING

The American Institute for Computer Sciences offers an in-depth correspondence course which allows you to earn your Bachelor of Science degree in computer programming at home. Subjects covered are: MS-DOS, BASIC, PASCAL, C, Data File Processing, Data Structures & Operating System Concepts. AMERICAN INST FOR COMPUTER SCIENCES 1704-PC 11th AVE. SO Birmingham, AL 35205 TOLL FREE 1-800-872-ACIS

TO PLACE YOUR AD IN
PC Magazine Marketplace

Call (212) 503-5115 or (800) 825-4ADS

MARKETPLACE

EDUCATION

THROW AWAY YOUR COMPUTER MANUALS!

Learn Popular Software Programs With . . . VIDEO INSTRUCTION TOOLS

Lotus 1-2-3 (4 hours)	\$ 99.95	WordPerfect 5.0 (5 hours)	129.95
DOS 3.3 (3 hours)	129.95	WordPerfect 4.2 (3.5 hours)	99.95
PageMaker 3.0-PC (2.5 hours)	199.95	Venture Publisher (2 hours)	179.95
Quattro III - (4 hours)	179.95	Venture Techniques (2 hours)	179.95
DisplayWrite IV (3 hours)	199.95	Symphony (3.5 hours)	199.95
Enable (4 hours)	199.95	Intro To IBM/PS 2 (3 hours)	199.95
Intro To IBM-PC/XT	79.95	MicroSoft Works	79.95
Intro to Spreadsheets	59.95	O & A	79.95
HyperCard - MAC	79.95	PageMaker 3.0 - MAC	199.00

- Self-contained, interactive training videos.
- Demonstrates every command in detail.
- Perfect for group/rep/retail training.
- Thousands of satisfied users!

Ask about our 60-day unlimited phone support hotline.

MICHAEL HALVERSON & ASSOCIATES
1313 Newburgh, Westfield, MA 01085
FAX (313) 729-0228
CALL (212) 729-0238

FOR PRODUCT INFORMATION
1-800-537-1641
MAJOR CREDIT CARDS ACCEPTED

Visit our display at Spring Commex, April 10-13, McCormick Place, Chicago

CIRCLE 606 ON READER SERVICE CARD

ENGINEERING

ENG/SCI GRAPHICS

OMNIPLOT (P) (screen graphics) & OMNIPLOT (P) (plotter driver) provide integrated engineering/science 2-D & 3-D graphics with NO PROGRAMMING REQUIRED! Menu-driven, flexible, professional Choice of formats: tabular/print, contour, bar, pie, 3-D wire frame & much more! OMNIPLOT (P) \$195, OMNIPLOT (P) with 3225 MICROCOMPATIBLES, INC
301 Prelude Drive
Silver Spring, MD 20901
(301) 583-0683

ARCHITECTS AND ENGINEERS

The AEMAS system is designed for Architects, Engineers & other firms where monitoring project costs is required. Modules include Job Cost, Payroll, A/P, A/R Invoicing, Personnel Scheduling, Project Generator and General Ledger. Multi-terminals are available.
DATA-BASICS
11800 Cedar Road, Suite 110
Cleveland, OH 44106
(216) 923-3400

**PC Magazine
Marketplace**
2nd Color
Option
Available

SIMULATION

GPSS-PC is a full-power version of GPSS, the most popular miniature simulation language. Specifically designed for interactive use on today's high-speed microprocessors, it is loaded with features such as interactive graphics and animation. Using GPSS-PC, you can predict the behavior of complicated real world systems.
MINUTEMAN SOFTWARE
P.O. Box 171-B
Stow, MA 01775
800-223-1430/508-897-5662 Ext 316

ENTERTAINMENT/ GAMES

SPORTS HANDICAPPING SOFTWARE
\$599 with horse racing & greyhound handicapping software \$32.95, \$52.95, \$67.95, \$77.95 each. Up to 17 entries analyzed, class, speed, times, odds, track, post, stretch, & finish. Pro Football, Baseball, Basketball Software. \$52.95. Handicap races & games in minutes. MCVISA accepted. Free info.
SOFTWARE EXCHANGE
P.O. Box 5382-PC
N. Bloomfield, MI 48303
(313) 626-7208. Order 1-800-527-9457

ENTERTAINMENT/GAMES

The COMPLETE Lottery TRACKER and WHEELER™

The MOST COMPREHENSIVE Lottery Software Program on the Market Today for PC-8

Garnet! Now Sold in all 50 states and 17 Foreign countries!

- Store Past 1000 Winning Lottery Numbers and Dates!
- Track as many State or International Lottery Games as you want! No Limit!
- Product EXPERT Trend Charts to Identify Those HOT and COLD Numbers!
- Analyze Hits 4 ways: Bel Curves, Recency, Percentages, Frequencies, MORE!
- Product STATISTICS for ALL Numbers You Play - NO Randomizing Here!
- Select Numbers to Play 5 Different Ways! You Choose what YOU Like Best!
- Check your Bets for WINNING Combinations! Record ALL Systems Played!
- Store up to 2 BONUS NUMBERS (Play all international games!)
- We include Lottery Data Base for State Games of YOUR CHOICE (Please specify!)
- Print Charts, Statistics, Recorded Numbers and WHEELING SYSTEMS!

Choose From the Worlds MOST Popular WHEELING SYSTEMS!

No other lottery software package provides all of these featured! When we say complete, WE MEAN COMPLETE! Easy to use MENU/DRIVEN SCREENS. Printer and Color Monitor recommended but not required for use. All wheeling systems and program features take only SECONDS to complete! Detailed Lottery user manual included. Why pay more for less?

Use our Years of experience with Your computer advantage!

1 MILLION CASH PRIZES in the first 8 weeks with the help of your program! The Tracker and Wheeler IS the BEST lottery software program I have used overall. . . over \$2500 ahead after ALL expenses! B.C. # Pass, TX # won 4 cash prizes the first 2 times I used the Tracker and Wheeler! S.L.M., Washington, DC

"The COMPLETE Lottery TRACKER and WHEELER IS SPECTACULAR!" E.D. New York, NY



Don't Hesitate! Place your Order Now!

ONLY: \$39.95 Plus \$2.00 SH&H

MCVISA Call Toll Free 1-800-824-7888, Ext. 283

For Canadian Calls 1-800-544-2600

Entertainment On-Line™, Inc. P.O. Box 100, Dept. PC, Waltham, MA 01981

PREMIERE Lottery Software and Audio Products Company

MC VISA and MC credit card orders 1 week. Please allow 2 weeks for Personal Checks.

MA Residents add 5% sales tax. ©1989 Entertainment On-Line™, Inc.

Order Direct or see Your Local Software Dealer

CIRCLE 751 ON READER SERVICE CARD

LOTTO EXPERT™ VERSION 2.0

In Pursuit of Fame and Fortune

"This is where Lotto Experts" separates the men from the boys . . ." PC Magazine

"A full feature program . . ." Miami Herald

By providing a comprehensive and sophisticated set of features, now with increased capabilities.

LOTTO EXPERT™ has become the top performing program of its kind

LOTTO EXPERT™ immediately:

• TACTICAL pop-up windows: analytical charts, tables, and plots • Generates over 120 game STRATEGIES for pick 2, 3, 4, 5 & 6 up to 30 numbers • Automated test Pick from Past Trends • Includes most LOTTERY DATA BASES (OR ADD-ON) • Supports for 4-6 up to fully distributed LOTTERY BODILY • Capabilities for ACCOUNTING, STRATEGIES • Supports for 4-6 up to 98 numbers • FAST response • USER FRIENDLY • MENUS • USER FRIENDLY • SUPPORTS

DON'T SETTLE FOR LESS, ORDER LOTTO EXPERT™ TODAY!

Send check or money order \$49.95 (plus \$3.50 S.H.) to:

LOTTO RESEARCH CORP., 400 20th St., Suite 200, New York, NY 10011

• Information: (212) 940-5400 24 hours a day • IBM PC/XT: true compatible. 386K, single drive 15" or 20" or 24" • DOS 2.0 or 3.0 or other • IBM is a registered trademark of International Business Machines.

CIRCLE 752 ON READER SERVICE CARD

TO PLACE YOUR AD IN

PC Magazine
Marketplace

Call (212) 503-5115
or (800) 825-4ADS

RUN COLOR GAMES on your mono monitor

Works with any color graphics card. Runs most of CGA programs, even self-booting ones. The best performance for your mono XT or AT system works great. Realistic and very usable even for test moving games. These Work: LASCAR, Flight Simulator, GRASP, PACMAN, ZAXXON, LOCKERUNNER, Pinball, etc.

\$29.95 **GO-COLOR**
1-800-854-0561 ext. 854 (orders)
\$2.00 shipping. CA res add \$1.00 MCVISA

Wilkinson Software
17801 Sky Park Circle, Unit E, Irvine, CA 92714
(714) 724-1230

CIRCLE 754 ON READER SERVICE CARD

PC MARKETPLACE

ENTERTAINMENT/GAMES

If You Play Games:
You Need GameMaster™!

New Year. L.S. of GameMaster gets the only protection from over 100 of the most popular PC/DOS/MS-DOS games and it's only \$49.95 plus shipping. The very best checks of game disks and run your games from your hard disk or a RAM disk. Make 3.5" copies for your portable computer. Don't be without a copy of GameMaster!

For IBM PC's and compatibles using DOS 2.0-3.0

To order your copy today: call 1-407/547-0799

FAX (407) 547-0798

or write to PCZone, Inc., 770 South US HWY #1 Suite 2, Hialeah, FL 33020

Ask about Unlick MasterKey™ for removing copy protection from over 200 business & engineering programs. Only \$99.95 plus shipping, or order both for \$130.00 + shipping.

CIRCLE 755 ON READER SERVICE CARD



ADUL SOFTWARE

25 vol. CGA / 10 vol. monographics,
World's largest collection!

\$7.75 ea. ppd (foreign orders \$3.50 add \$1.00 ea.)

25 vol. set \$39.95 • Monographics 10 vol. set \$49.95

Free Catalog! USA/INC. No need to 21—please state age.

Gold Coast Computing Services

P.O. Box 1257-PCM, Secaucus, NJ 07096-1257

Orders Only: 1-800-825-018X Customer Service: 1-201-884-0824

CIRCLE 756 ON READER SERVICE CARD



ADUL SOFTWARE

For IBM PC, XT, AT PS/2 & Compatibles

World's Largest Distributor

Now-Same Day Shipping

Volume I \$11.95 ppd

Volume II \$11.95 ppd

Volume III \$11.95 ppd

911 Hru 911 \$5.00 each ppd

Catalog Disk \$5.00 ppd

Check or money order accepted

Foreign orders \$3.50 add \$1.00 per disk

ADS & P.O. Box 100-PC, Marlton, CT 06444

CIRCLE 757 ON READER SERVICE CARD

LOTTERY JACKPOT WINS!
NOT JUST DUMB LUCK

Carl Henrich's latest book... LOTTO: How to Win & What to Expect gives you the best mathematical information available on how to improve your odds of winning the LOTTERY

AT LEAST 13 MAJOR LOTTO PRIZES INCLUDING 8 FIRST PRIZE JACKPOTS TOTALING OVER \$1 MILLION! WE'RE WINNING USING CARL'S SYSTEMS.

Only this book has over 100 ways to use Carl Henrich's system.

*Valid Missouri Win Guarantee

*ELCCT Guaranteed CDSOR

IMPROVE MY UP to 66.7%

*Multiple ways possible with each system (ONLY \$14.95-\$19.95)

FOR YOUR COMPUTER

CARL HENRICH'S SMART LUCK

COMPUTER MESSAGES

No other lottery computer system offers so much! System also checks for wins \$200-\$2500

CARL HENRICH'S SMART LUCK

COMPUTER ADVANTAGE

Play the best numbers to play on your favorite state or International Line game (57 for each additional Line-game) Please specify \$29.95-\$34.95

DENO DEMO AVAILABLE

For your evaluation of Carl Henrich's SMART LUCK

COMPUTER ADVANTAGE™, \$5.00 Cash or check only

SMART LUCK

PC Box 158 Dept. PC-11 White Plains, NY 10622

(800) 876-G-64 (4245) charge orders only

(312) 934-3360

CIRCLE 758 ON READER SERVICE CARD

THE SHOWCASE
FOR PRODUCTS
AND SERVICES IN
THE MS DOS
MARKET . . .

FINANCIAL

MONEYCOUNTS 5.0
The \$29 Money Management
Solution. Guaranteed.

MONEYCOUNTS 5.0 is the easy-to-use, CPA-designed money management/accounting program for home and business. It offers: Cash, checking, savings & credit card management, checkbook balancer, budgeting, financial statements, graphics, last financial data base with three-way look-up, inquiry reports & on-line help. Handles up to 999 accounts and 100,000 transactions. Includes printed manual. Net copy protected.

MONEYCOUNTS 5.0 also

- prints any type of pin-lead or laser check & updates your records automatically
- estimates your 1988 income tax
- analyzes financing options & savings programs
- computes interest rates & loan payments

- prints amortization schedules
- manages mail lists — zip & alpha sorts — prints labels & order cards
- provides password protection. Invaluable year support & pop-up notepad
- 30 day money back guarantee (minus shipping)

Call or send \$29 plus \$5

shipping/handling

Check/VISA/MC/C.D.

1-800-223-6925

(In Canada 319/395/7300)

Dept. M

373 Cedar Road N.E.

Cedar Rapids, Iowa 52402

CIRCLE 760 ON READER SERVICE CARD

METASTOCK
PROFESSIONAL

Combine your intuition as an investor with the brainpower of computerized technical analysis. MetaStock™ Professional offers a wide variety of sophisticated charting tools for stocks, bonds, commodities, futures, indices, options and mutual funds. \$295.

- Up to 36 multiple, movable windows
- 40+ pre-programmed indicators
- Compatible with 16+ data services
- Desktop publishing compatible
- Create your own formulae

- Profitability tester
- Import/export data
- Unattended operation
- Supports over 130 printers
- Extensive user's manual

For a \$2 demo disk, or for complete literature, call toll-free:

1-800-882-3040

EOUS International, Inc. Box 26743, S.L.C., UT 84126 801-974-5115



CASHTRAC®

"The best checkbook balancing program I've seen yet. **BLISSFUL!**"
—PC-SIG Magazine

Track all your money in a familiar check register format with:

- 16 checking accounts
- 255 investment accounts
- Unpaid bill scheduler
- On-line help
- Pop-up calculator
- Prints job reports & bar charts
- Prints any format check
- Spreadsheet & data base interface
- Detailed printed manual
- Voice and e-mail tech support

THIS ONE DOES IT ALL. No other modules needed! BBS, 5.01 included.

Call 301-848-9359 or write CashTrac, Inc., Inc. P.O. Box 2007, Gaithersburg, MD 20878

VISA, MC, Discover & American Express are accepted. Cash orders shipped with 30-day money back guarantee.

CIRCLE 751 ON READER SERVICE CARD

Historical Stock Market Data

For use with spreadsheets & Charting Software
MOLLY with over 150,000 daily prices (4 Moynett on major indexes. Many from the 1920s, including all 3 Dow indexes; S&P 500, etc. Rates, NYSE Advance Declines and more for \$199.95.

ECONOMIC Database with 160 data series, most begin in the 1940s; for \$159.95.

INTERNATIONAL Index Database: Tokyo, London, Hong Kong, Toronto and many more (14 total). All daily from 1980 some include daily yield & P/E ratios. From \$200.

Files are in dBase III format. IBM & Mac. Demo disk \$5. Guaranteed!

MarketBase, Inc.

250 W. 90 St. Suite 12K New York, NY 10024

1-800-MARKET 5

CIRCLE 762 ON READER SERVICE CARD

TO PLACE YOUR AD IN
PC Magazine Marketplace

Call (212) 503-5115 or (800) 825-4ADS

MARKETPLACE

FINANCIAL

Legal, Finance, Real Estate **EAC-A-MOKE™** Loan Amortizer Plus Software™ IBM PC, AT, PS/2, and compatible

- Used by thousands of Attorneys
- Used by hundreds of Banks
- Used by big CPAs
- Used by thousands of Mortgage
- Used for Joint/semi-Joint P/R's
- Used to verify lender's figures!
- Present Value
- Future Value
- Net Present Value
- Internal Rate of Return
- Yield & Loan Price
- Easy to use menu
- Points & Fees
- Prepaid Interest
- Extra Payments
- P/R Payments
- Between Payments
- Steady for the Un-Borrower

Only **\$149.95** + \$5 S&H
Demo disk & manual available for \$20-\$25 S&H

ELECTRONICS
36382 Garfield #1, Fraser, Mich 48826
800-858-8448 or 313-791-0770
Check Visa MC Amex & Discover are welcome
CDS, online address \$2.00
60 day money back guarantee!
CIRCLE 76 ON READER SERVICE CARD

FLOWCHARTING

Flow Charting II+



The New Plus for Fast Flowcharting

FLOW CHARTING is new! It's now Flow Charting II+, with more speed + more functions + more printing options;

- 10 text fonts; 26 shapes;
- Line mode can stop at a shape;
- Background key can erase a line to its origin;
- Free text entry anywhere, or select auto-centering;
- Vertical or horizontal printing; one chart or multiple charts.

Used by Fairchild, Bechtel and more than 500 other major corporations. Edit quickly and accurately — even major edits — with Flow Charting II+, the Specialist.

See your retail store or call:

PATTON & PATTON
Software Corporation
1-800-525-0082, Outside California
408-629-5376, California/Int'l.

CIRCLE 76 ON READER SERVICE CARD

FLOWCHARTING

BETTER FLOWCHARTER

Know before you buy! EASYFLOW is the superb flowcharting program chosen by over 30,000 users, and very favorably reviewed in the March 10th 1987 issue of PC Magazine. See the "Index to Advertisers" under H/WENTREE to find our large display ad in this issue. Now available with 30-day MONEY-BACK guarantee. HavenTree Software Limited
Order Desk: 1-800-267-0668
Information: (613) 544-5035
Telex: (613) 544-5632

GRAPHICS

35mm SLIDES—In 24 Hours

We transform your PC-Graphics files into full color, 35mm, 4000 line resolution slides and ship within 24 hrs. All popular PC-Graphics Packages supported. Files accepted by modern FREE FEDERAL EXPRESS on all orders of 20 + slides! Only \$8 per slide
Accord Presentations, Inc.
990 Highland Drive, Ste 202
P.O. Box 1303
Solana Beach, CA 92075
1-800-222-2592

35mm COMPUTER SLIDES — \$5.95

Design your own presentations with your PC and popular graphics software packages (Freehand, Applause, Harvard Graphics, etc.). We convert your graphics files into beautiful quality, 4k resolution slides. Finished slides on your disk in 48-80 hours. Files accepted by modern or disk, 800-433-8829 for free kit
IMAGE CENTER, INC.
P.O. Box 2570
Roanoke, VA 24010
703-343-8243 • Telex: 7407-469

STANDARD GRAPHICS

PC VGA graphics built! Optimized, ANSI, ISO GDI compatible. Mapping arcs, text, orient, align, font loading, figure fill, image, bundles & hundreds more. Segmentation, raster, input option set. Drivers: Works with most "C", MS "FORTRAN", "DuoBASIC", EGA/VGA Demos, Manual. \$395 Amex. Ask about OS/2 ver H/W&H INC.
P.O. Box 88976
Schmaling, IL 60168
312-882-4111

35mm SLIDE FROM YOUR PC

COMPUTER SLIDE EXPRESS converts graphic files produced on the IBM PC into brilliant 35mm color slides with color resolution 400% better than your monitor. Leave your printouts behind. Use high resolution color slides up to 4000 line. COMPUTER SLIDE EXPRESS \$9 slide
VISUAL HORIZONS
180 Metro Park
Rochester, NY 14623
(716) 424-5300

GRAPHICS

THE 9 TO 24 PIN PRINTER TRANSLATOR IBM 5% 31%
STOPS STRETCH FROM AUTOCAD
VENTURA PLOT SHOP-MASTER TAXVIEW
50% 100% OF 9 PIN GRAPHICS PROGRAMS. (618) 743-5315
PRINTS ALL GRAPHICS IN LQ. FAX (618) 746-0831
Supports 60 Printers
Recommended by Epson, NEC,
Panasonic, Seiko, Star, Toshiba,
Autodesk, Software and more.
VISA/MC
Permyth Int. Inc.
3438 Laramie Ln
Evanston, IL 60201

CIRCLE 76 ON READER SERVICE CARD

GRAFPLUS
Power Pack four PRG's. Any!
Only \$49.95
GraPlus™ turns any IBM or compatible graphics application into a powerful communication by printing exactly what you have created on your computer screen.
• Link into PageMaker or Ventura
• Scale the image to any size
• Print in color, black-on-white, white-on-black
• Print vertically or horizontally
• Work with virtually any file mapped to screen, hard, or silent printer

Jewell Technologies, Inc.
4745 Oak Ave. S.W. Suite 203
Seattle, WA 98148
206-977-3008

RAINBOW™

FAST, flexible, easy to use, compact T-S-B utility to send screen graphics to your 9 or 24 pin dot matrix, jet, or laser printer. Create quality low or color printer graphics from applications AND user written programs. Full 24 pin support. Many options. Complete driver library \$39.95
RAINBOW TECHNOLOGIES
8106 St. David Court
Springfield, VA 22153
703-440-0064

FORTRAN-PASCAL GRAPHICS

GRAFMATIC (screen) Microsoft Fortran/Pascal, R-M, Lahey callable routines. Graphics primitives, table 2-D plot support, 3-D plots and solid models. G-24 G-24 Hayes micro support. HP/HPe plotter? PLDTMATIC Laser, dot matrix printer? PRINTMATIC \$135 as Any 2, \$240 all 3, \$340. Ask about our 15 fonts. MICROCOMPUTABLES, INC.
301 Prelude Drive Dept. PC
Salem, MA 01970
(508) 593-0663

PRINTED GRAPHICS WITH TURBO

GRAPHBLINK does for your printer what TURBO PASCAL's BGI graphics does for your screen—in ultra-high resolution! GRAPHBLINK commands work exactly like TURBO's BGI commands, so adding printed graphics to your programs is a snap—and requires only two additional lines of code! Supports HP, Epson, IBM, NEC & Toshiba printers. Only \$95 + \$4 sht
VISITCOM SOFTWARE
OS 3807 Ridgeway Ct
Pittsburgh, PA 15239 412/733-4775

PILOT™

Interactive Graphics & Statistics
Create graphs the way you want them. 35 graph types can be used to create numerous renditions. Make posters and flow charts—with full screen editing of text.
• Vary character font, size, position, color
• Stack and overlay graphs
• 3-Dimensional graphs: fishnet & contour
• Linear & Non-Linear Regression
• Stochastic Distribution
• Independence Testing
• Descriptive Statistics
Contact: Scientific Programming Enterprises, P.O. Box 669, Haslett, MI 48840 (517) 339-9859
CIRCLE 76 ON READER SERVICE CARD

BUSINESS GRAPHICS PLUS!

GRAPH-IT, a full menu driven spreadsheet worksheet justification, creates 2-D & 3-D graphs, and bar/bubble Bar Line, Pie, Area, X-Y, Stock Hi-Low, Linear Regress, Combs & more. Also add notes to graphs. Great for presentations. User Manual. Specify 5-1/4" or 3-1/2". \$37.50 + \$2.50 sht
SHADOW SOFTWARE
6 Williams St., Dept. M
Pequannock, NJ 07440
201-694-4976

AMAZING TECHNICAL GRAPHIS

--- Introducing **Asym™** ---
Discover how easily you can create publication-quality scientific graphs on your PC.
• ultra-high resolution, color, 2-D & 3-D
• import Lotus-80 data, export WP/WordMaker
• analyze, explore, display, customize
• intuitive menus, online help, interactive
60 Day Money Back Guarantee \$495
Infotek, Inc. (800) 546-5653 ext 234
444 NE Powers, #210PC (206) 527-1801 in WA
Seattle, WA 98115 (206) 547-0326 FAX

MARKETPLACE

HEALTH

ANALYZE DIETS, MENUS & . . .
so much more with The FOOD PROCESSOR II! This TOP-rated software has the best database of any system on the market today! Acclaimed by schools, colleges, hospitals, homes, fitness centers & businesses. 2400-3000 foods-30 nutrients. \$250 IBM-Apple-Macintosh. CALL OR WRITE TODAY FOR FREE DEMO DISK! ESHA Research P.O. BOX 13028, Dept M SALEM, OR 97309 (503) 585-6242/7755

Diet Analyzer
Ideal for weight control, menu planning, special diets, recipe analysis. Tracks calories, sodium, cholesterol, fiber, +20 others for 1000 foods (incl. many fast-foods & 100+ recipes). Can add more. Multi-day averages. \$49.95 + 2.50 s/h. 30-day trial. AMEX/MC/VISA/Chk. Demo disk \$5. Free catalog. Natural Software Limited 129 Pearson Place Ithaca, NY 14850 800-625-2511 607-272-0157 (NY)

ONETWIS-EFFICIENCY
For Diet, Nutrition, Fitness conscious people
• Diet Evaluation (children and adults)
• MENU Analysis
• RECIPE
• BODY COMPOSITION
• ENERGY EXPENDITURE
• MS/DOS \$39.95 (professional ver. avail.)
NUTRITIONAL DATA RESOURCES P.O. Box 540 Willoughby, Ohio 44094 800-NDR-DIET Ohio (216) 951-6593

INVENTORY

*****OFFELLER INVENTORY*****
A business inventory program written in modifiable dBASE source code. The menu-driven program lets you locate items by inventory name or number. It keeps track of vendor prices, vendors, average cost & other information.
• OFFELLER Inventory \$150/Requires dBASE II/III
• OFFELLER Plus \$200 with History & P.O.s
Requires dBASE III-IV PLUS (for stock rooms)
OFFELLER ASSOCIATES
550 CR. PR. RD. SUITE 3
Lafayette, MI 48649
*** (306) 486-5024 ***

INVENTORY MANAGEMENT
Stock-Master 4.0, commercial grade system provides Stock Status, Purchase Order Writing & Tracking, Trend Analysis, Quality Control Reporting Detail Analysis, Bill of Materials, Multi Locations and more. Modular, "micro" priced & configured to your needs. Cabot Source available.
APPLIED MICRO BUSINESS SYSTEMS
177-R Riverside Ave
Newport Beach, CA 92663
(714) 759-0582

INVENTORY

POINT OF SALE INVENTORY PROGRAM
Maintains 10,000 item inventory
Opens Cash Drawer
Prints Sales tickets on 40 and 80 column Printers
Fast, Easy to Use
Supports A/cs Receivables and Mailing List programs
\$89.50
35 inventory & UPS shipping programs
Cash drawers & receipt printers
Freeman Software * Garland, TX
800-426-6598

CIRCLE 167 ON READER SERVICE CARD

MAILING PROGRAMS

MAIL ORDER MANAGER (MOM)
If you need order processing, list management, inventory control, and query-driven profit analysis, MOM is for you. And, we're NETWORKED—multiple order entry stations, we do it! Most competitors can't. Clipper compiled, dBase III Files. \$885. Slide Show demo FREE with this ad. Working demo \$45.
Dyadcomp Development Corp
P.O. Box 641
Wayne, NJ 07474-0641
(201) 694-9779

POSTWAVE MAILING SYSTEM
Automatic mail preparation. Cut postage costs by 5¢ per piece or more. Only PostWave prints address labels in bundle and bag, bulk mailing order. Not a useless zip code sort. Prints address labels, bag tag/return labels. Calc postage. Works with dBase III PLUS, dBASE, PowerBase, Smart & others. Also ASCII.
• 1st & 3rd Class—\$195 • 2nd class—\$395
• Carrier Route—\$300 • Dup. Detector—\$200
PostalSoft, Inc.
515 Division Street
La Crosse, WI 54601-4544
608/784-3500 800-831-MAIL (5245)

THE MAIL ORDER ACCOUNTANT
Order fulfillment list management. Includes customer lists, labels in 6 formats, inventory, invoicing, accounts receivable, customer payments by credit/debit card. Prints shipping labels, credit card slips, UPS shipping manifests, sales tax report. dBase III Plus source code provided. \$975, demo \$25 + \$3.50 S/H.
GOLDSMITH & ASSOCIATES
48 Shattuck Square, Suite 86-B
Berkeley, CA 94704
(415) 840-5396

PC Magazine Marketplace
2nd Color
Option Available

MAILING PROGRAMS

Speed Up UPS Shipping with ShipMate
Intro Offer \$395
UPS Approved—Prints COD tags, labels, and manifest.
PC Synergy * 1805 Cottonwood * Carlsbad, CA 92009
(619) 931-0350
"It's so easy—even the boss can use it!"

CIRCLE 168 ON READER SERVICE CARD

The Mail Order Wizard
Is one very powerful program. It offers a catalog business all the computing routines it needs—and then some! Gives new meaning to the hackneyed phrase, "user friendly." Written in Assembler, it operates with lightning speed. Very serious software, a must see. Catalog Age, \$870, Demo, \$12.
The Haven Corporation
802 Madison Dept. M
Evanston, IL 60202
(312) 869-3434 or (800) 782-8276

MANUFACTURING

THE FOREMAN
Multi-user Now Available!
• Inventory/BOM/PO-Costing
• MRP/Inventory/Ad hoc reports
• Repetitive mfg or one time build
• Extensive Cost Control. Standard vs. Actual
• Automatic release interface
• IBM PC/NOVELL/AT/OS
DCM COMPUTER PRODUCTS, INC.
43700 Twelve Mile Road
Novi, MI 48050
(313) 347-9600

pcMRP
pcMRP can make life easier by tracking every aspect of your growing concern. pcMRP's integrated modules include accounting, sales purchasing, inventory, receiving, stockroom, bills-of-materials, invoicing/billing, and customer/vendor address book. pcMRP integrates information from each element of your business into a unified package.
"Working Demo Disk complete with manual \$25
"Single User Package \$295.00 Complete
"Multiuser Package \$950.00 Complete
SOFTWARE ARTS CONSULTING
P.O. BOX 3621
Santa Clara, CA 95051
(408) 248-6445
Call for free literature

MEDICAL

COMPU-MEDIC™
PROGEN Practice Management System—in use by 4 yrs. Electronic claims, A/R, APGL, scheduling, statements, insurance forms, practice analysis, word processing, recall, delinquent tracking, historical data. FLEXIBLE user designed forms/reports. Call for pricing. Dental (DentalWare™), eyecare/optometry (EyeMate™) & Vet (Vet-Logic™) also avail. Dealer inquiries invited.
DATA STRATEGIES, INC.
17150 Via Del Campo Suite 203
San Diego, CA 92127
(619) 451-0480

MEDICAL

MDX-PC™
MDX-PC brings you the best of both worlds: the power and flexibility of MDX medical-office software in a PC-DOS format. Fixes for any specialty; manages billing, electronic claims, custom reports, medical records, more. Full upgrade path to MDX with UNEX/Ames. Call for info and free videotapes.
GALTY CORPORATION
150 N. Sunnyside Rd., Brookfield, WI 53005
(800) 958-2208 or (614) 782-6386
CIRCLE 169 ON READER SERVICE CARD

MedicAide
Complete A/R Patient Billing System with
• Billing Statements & Insurance Claims
• Flexible Adjustments for Ease of Use
• Practice Mgmt Reports with Graphs
• 99 Doctors & 99 Fee Schedules
• Word Processing with MailMerge
Excellent VAR/CONSULTANT Opportunity
\$199.00
~ 30 Day Money Back Guarantee ~
(602) 421-1287
1005 Avenida De Delano, Suite 3
Casa Grande, IL 60222
CIRCLE 170 ON READER SERVICE CARD

STAT MEDICAL SYSTEMS
STAT modular systems grow with your medical, dental or ophthalmic practice.
\$195 Base system: patient data base, recalls, report generator, letter writer & more.
\$395 Print of service transaction processing (Superbills, financial reports, receipts).
\$395 Patient billing module (statements).
\$695 Automatic 3rd party billing, billable claim forms with ICD/procedure codes. See full featured demonstration disk & doc. ***** 30 day money back guarantee *****
GAMMA Incorporated
Three Dundee Park
Andover, MA 01810
(508) 470-0080

MARKETPLACE

MUSIC

PC/Musicpak... \$249

Industry-Standard MIDI Interface and Sequencing Software from the most respected name in the PC Music business.



333 3th Ave., Dept. C,
Pelham, NY 10803 (914) 736-4500
Send for our free PC Music catalog

CIRCLE 771 ON READER SERVICE CARD



MIDI
IBM Interface
CMS-401/Cakewalk
\$249
Keyboard & Software Available

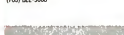
EVS
DIGITAL
MUSIC
SUPPLY
714/594-8051 (CA)
CIRCLE 772 ON READER SERVICE CARD

FORTE I/II MIDI Sequencers

16/32 Tracks, 16 channels/track Records/Playback 1,000,000 notes. Most powerful MIDI editing. Rhythmically flexible Step entry Auto Punch, quantization, realtime playback control, DCS shift flow in FORTE II System exclusive storage, unlimited looping, SMPTE cue list, Songlist, Accompanied \$150/\$250 LTA Productions
P.O. Box 6623
Hamden, CT 06517
(203) 787-9657

SONGWRITING IV

Music Processor prints professional sheet music, staves, scores with text, chords, symbols. Compose, edit, copy, record, transcribe, play, transcribe to any key. Backbeats, multiple staves, all meters. MIDI optional. IBM/Epson/Star printers: CGA/Heracles graphics \$89.95. Send for free sample output.
Songwriting Software
Route 1, Box 83
Lowellville, IN 42060
(703) 822-9068



PREVENTATIVE MAINTENANCE

Memory Minder

Memory Minder is the most comprehensive disk diagnostic program available for microcomputers. Any operator can quickly and easily check the vital operating parameters of their floppy drives, including spindle speed, head alignment, read sensitivity and others. Run Memory Minder before vital data backup operations. Use it to align the drives without the use of an endoscopes.

IBM PC, XT, AT program and manual \$70
Precision Alignment Diskettes sold separately
\$40 each 5.25" 40 track, 5.25" 80 track, 1.2 MB AT, or 3.5" 80 track drives.

JIA J&M Systems, Ltd.
15100-A Central SE
Albuquerque, New Mexico 87123
505/293-4193
We accept MasterCard and Visa

CIRCLE 773 ON READER SERVICE CARD

MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize, operate, and control an effective preventive maintenance system. Applicable to a wide variety of business or industry. Full screen input and displays, plus function key help command. Maintains historical data, creates work orders, and provides numerous reports. For info write to:
PENGJIN COMPUTER CONSULTANTS
P.O. Box 20485
San Jose, CA 95160
(408) 997-7703 FAX 408-927-0570

PROGRAMMERS TOOLS



CODE MASTER
Compile Fast Bar Code
Printing Into Your Programs
With Code Master

- Prints UPC, Code 39, 30, 128, Codabar, and more.
- No Revisions.
- Supports C, C++, Pascal, Basic, and more.
- Data Search, On-2 compatible.

\$149.00 \$249.00 w/extra code

THE COMPUTER

Box 634, Elm Claire, WI 54708
(715) 833-2331 FAX (715) 833-2331

CIRCLE 774 ON READER SERVICE CARD

Opt-Tech Sort/Merge 3.0

Extremely fast Sort/Merge program. Runs as a DOS command or CALL as a subroutine. Unlimited filesizes, most languages, datatypes & linkages supported including Btrieve and dBASE II & III. Advanced features include record selection, record reformatting & much more! Call or write for more info. MS-DOS \$149. Zenix \$249.
Opt-Tech Data Processing
P.O. Box 678
Zephyr Cove, NV 89448
(702) 586-3737

PROGRAMMERS TOOLS

QuickBASIC Programmers

We are the leading publisher of Programmer's Tools for QB. Our specialty is assembler subroutines, and we even have a package that lets you make your QB programs memory-resident in as little as 8K of memory!

Call Toll Free or write for detailed information with no strings attached.
1-800-922-3393 • 404-552-0565 • CALL M-F, 9-6 Eastern Time
MicroHelp, Inc. • 4636 Huntbridge Drive • Roswell, GA 30075

CIRCLE 775 ON READER SERVICE CARD

FREE

BASIC Programming Magazine

Crescent Software, the leading manufacturer of BASIC tools and utilities is pleased to offer a copy of our QuickTALK magazine. More than just a catalog, it contains feature articles, tips and tricks, and of course a complete description of our products. Please call or write for your free copy!

Crescent Software

11 Grandview Avenue, Stamford, CT 06905 (203) 846-2500

CIRCLE 776 ON READER SERVICE CARD

Borland Programmers

CREATIVE INTERFACE TOOLS

Create graphic mouse cursors, symbols, bit-mapped character sets, and dynamic, self-calculating menus in text or graphics.

Control program flow with keyboard or mouse.

Supports Turbo C, Turbo Pascal.

Turbo Prolog and Turbo Basic.

Three features, one price: \$69.95

1-800-622-8366

Maxx Data Systems, Inc.

1126 S. Cedar Ridge, Ste. 115
Duncanville, TX 75137

CIRCLE 777 ON READER SERVICE CARD

FREE BUYER'S GUIDE

Call or write for your FREE comprehensive Buyer's Guide which contains descriptions of over 800 software products from more than 300 manufacturers, plus informative articles by some of today's industry experts. Programmer's Connection has supplied the professional programmer since 1984 with quality products by offering unbiased advice, low prices, fast delivery and no hidden charges.

Programmer's Connection

7249 Whipple Ave. NW
North Canton, Ohio 44720

USA 800-336-1166

Canada 603-225-1165

International 216-494-3781

FAX 216-494-5260

Telex 3102403679

CIRCLE 778 ON READER SERVICE CARD

TO PLACE YOUR AD IN

PC Magazine
Marketplace
Call (212) 503-5115
or (800) 825-4ADS

SOURCE CODE NO ROYALTIES

BOSS INTEGRATED ACCOUNTING VERSION 2.0

Slash development costs with BOSS ACCOUNTING. Fully integrated modules including G.L., A.R., A.P., PAYROLL and INVENTORY. COMPLETE PASSWORD SECURITY, MULTI USER, NETWORK compatible. BOSS is available for QuickBASIC 4.x or IBM BASCOM 2.0. Features clean well annotated code. Easily modified. No licensing fees. All resale profits are yours!!

ONLY \$995.00

- Ask about our
- ISAM interface to QuickBASIC 4.x
- Vertical market applications

LAKEHORE

COMPUTING, INC.

1105 North Fifth Street, Wren, MI 49120

1-800-245-4214 in MI 810-884-8120

CALL TODAY

CIRCLE 779 ON READER SERVICE CARD

MULTI-USER DATABASES
ENTIRELY IN TURBO
PASCAL! THIS FREE
BROCHURE TELLS
YOU HOW.



Call 408-438-8608

or write:
TurboPower Software
P.O. Box 66747
Scotts Valley, CA
95066-0747



MARKETPLACE

PROGRAMMERS TOOLS

SOURCER™

COMMENTING DISASSEMBLER

Sourcer, creates detailed commented source code and listings from memory, COM files or EXE files directly suitable for assembly. Built in data analyzer and simulator receives multiple data segments and provides detailed comments on interrupts and subroutines. (0 ports and much more.) Operates BIOS Pre-Processor, generates detailed commented listings for any BIOS. Out standing review in PC Magazine 4/25/88 pg. 46

SOURCER . . . BIOS Pre-Processor . . . \$ 99.95
SOURCER . . . BIOS Pre-Processor . . . \$ 129.95

(Shipping \$3 outside USA/BK, CA Res. add tax)
To order or receive information call Galt
1-800-662-8266
V COMMUNICATIONS
1031 Tech Way Suite 905, Dept. PC
San Jose, CA 95128-1408; 240-4224

'C' DOCUMENTATION TOOLS

- **C-CAL (59)** creates a graphic-tree of the code/compiled structure, and creates a tree-in-procedure table of contents.
- **C-HDR (59)** creates/inserts/updates headers for each procedure showing call/compiled procedures and identifiers.
- **C-LST (59)** lists and action-diagrams or reformats (incl. comment alignment).
- **C-REF (59)** gives cross-reference of local/global/parameter identifiers.
- **SPIICAL (59)** of all programs plus SPIE integrated C-DCC program.
- **30-DAT** money-back guarantee.

SOFTWARE BLACKSMITHS INC.
6054 St. Hwy
Mississauga, Ont. Canada L5N 4H7
(416) 858-4464 HCAL NOW!!

CIRCLE 790 ON READER SERVICE CARD

PUBLIC DOMAIN

California FREEWARE

ONLY \$5.95 per disk only \$5.95 per disk only \$5.95 per disk only \$5.95 per disk

Public Domain Software and Hardware for sale and Computer (C) 1987 by J. R. Rogers

<p>1. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>2. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>3. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p>	<p>4. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>5. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>6. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p>	<p>7. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>8. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>9. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p>	<p>10. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>11. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p> <p>12. BATTLESHIP (11/87) . . . 100% A classic game of battleship. Includes a computer opponent.</p>
--	--	--	---

CIRCLE 792 ON READER SERVICE CARD

FREE SHAREWARE

INTRODUCTORY OFFER

- 5 loaded disks for IBM
 - 10+ latest programs
 - Never before distributed
 - Plus our latest catalog
 - No charge for software,
 - Pay only \$5.00 sh
 - Visa/MC/Amex/Check
- International Software Library
511 Encinites Blvd. Ste 104
Encinitas, CA 92024
800 669-2669

CIRCLE 794 ON READER SERVICE CARD

\$2.00 PER DISK 75¢ This Ad

20 TOP IBM PC/SW DISKS
(360K) ONLY \$15 + \$3 SH

QuikCalc, EDRAW, AutoMath, Much Tutor, PC DOS Help, Dealer's Dozen, Languages, G2-Form, PC Style, RockDisk, PC Stock, McGramm, Bent Games, Home Inventory, PC Outline, Form Letters, ImagePrint, SideWriter, PC Prompt, Bent Utilities

FREE CATALOG

BRIGHT FUTURES Inc.
P.O. Box 1030, East Windsor, CT 06088
Circle 795 ON READER SERVICE CARD

FREE IBM SOFTWARE CATALOG

Detailed Descriptions

1000's of Great Programs
Only \$2.95 per Disk
Carefully Selected
Fully Tested
Includes Exclusive
2 FREE disk offer
NATIONAL SOFTWARE LABS
13376 Washington Bl. #7 Dept A
Los Angeles, CA 90066
Write or Call (213) 827-7899

CIRCLE 796 ON READER SERVICE CARD

MORE BYTES FOR THE \$\$\$

We carry only the BEST Shareware/PD programs in our library. Many new updates/editions! Over 700 disks FULL of useful programs, as described in our FREE 40 page (printed) catalog! As low as \$15.00 25¢ disk and \$3.50 5 1/4" disk! Orders shipped in 24 hrs. MC/Visa.
BIG BYTES Software (was GLW Software)
P.O. Box 14008
Arlington, TX 76014-1008
(817) 265-2007 (24 hrs.)

PUBLIC DOMAIN

PEOPLE'S CHOICE

BEST VALUE

Shareware/Public-Domain Programs less than 60 cents each!!

Take a close look at other companies distributing Shareware, and you will see — Other companies advertising in this magazine either charge \$3.00 or so for a diskette with one single program, or you have to commit to buy a certain number of disks to get their "special offer". But at PEOPLE'S CHOICE, over 2200 programs are available from a collection of over 330 disks, each disk (full of programs) is listed and described in our 36 page catalog, and can be bought in any quantity for only \$3.75 per diskette! With an average of over 5 programs per diskette, you pay less than 50 cents per program! And WHAT A SELECTION! The programs in the PEOPLE'S CHOICE collection includes — Word Processors! Accounting Systems! Games! Utilities (Disk, Printer, Screen, etc.) PC DOS Jones! Programming Languages! Database Systems! and much, much more! Because of the large number of programs in the collection, we couldn't even begin to list in this what is contained in the collection. But, you can call, and the complete FREE catalog will be sent right out to you. Once in your hands, you will be able to enjoy useful and interesting programs at just a fraction of the price that other companies charge!

People's Choice
P.O. Box 171134-P
Memphis, TN 38187
1-800-999-0471
(Nationswide catalog orderline)
1-801-763-0471

CIRCLE 791 ON READER SERVICE CARD

FREE IBM CATALOG

64 pages!
Software, Ribbons, Labels, Books, Etc.

Best Bits & Bytes
P.O. Box 8245-M
Van Nuys, CA 91410

Toll Free — 24 Hrs.
1-800-245-BYTE
Within California
1-818-764-9503
CIRCLE 793 ON READER SERVICE CARD

MARKETPLACE

PUBLIC DOMAIN

FREE PUBLIC DOMAIN & SHAREWARE CATALOG

Lowest at \$1.50 per Disk
Best Quality
Fast Service

Over 1000 IBM Software
On 5 1/4" and 3.5" format.

Write to:
SOFTSHOPPE
POB 709, Ann Arbor, MI 48105
(313) 763-8721

CIRCLE 787 ON READER SERVICE CARD

REAL ESTATE



The Most Advanced System Available

Every function & feature for
Owners & Managers.
Commercial, Rental & Residential
Easy to learn and use
Unlimited owners, properties, units & tenants.
Unlocks any number of users.
"Helps your business grow"
Complete Demonstration with 300 page
User Manual only \$35 (Visa/MC/DD)

Comtronic Systems
33305 First Way South, Suite 210
Fountain Valley, WA 98003
206-874-4034

Meets all requirements of the
Institute of Real Estate Management.

CIRCLE 788 ON READER SERVICE CARD

L-PLOT...

A Miles & Bounds program to plot/print plots of any scale. Any description. Use any measurement! Calc areas, error of closure, plots multi tracks IBM/compat with monographs, CGA or EGA capable. \$190. Or send \$15 for real working demo, refundable with order. Visa/MC/DD. Free info!
LAWS/CAN, Inc.
P.O. Box 6863
Arlington, TX 76008
(815) 672-2901

DEED PLOTTER PLUS

Our miles & bounds software is very popular with attorneys, appraisers and govt agencies. Accepts all standard input measurements including curves. Prints user scaled maps. Reviewed by professional journals. Send for more info. 14 day money back guarantee. Visa/MC/DD/CX \$99.95 + \$2 S/H.
Greenbrier Graphics, Inc.
1102 Main St., P.O. Box 724
Barnesville, WA 22062
304-438-8157

REAL ESTATE

MANAGEMENT & ANALYSIS

"Real Property Management" \$395-\$595 for residential & commercial properties and other bldg's. Flags delinquent tenants, prints budgets, checks, invoices & 1099s. No retyping of recurring data. "Real Analyzer" \$195, when deciding buy/sell, exchange, or refinance. 30 day money back guarantee.
REAL-COMP INC.
P.O. Box 1210
Cupertino, CA 95015
(408) 996-1160

PROPERTY MANAGEMENT

Comprehensive program for managing residential, commercial, condos, and more. Three versions: Basic PM for owner/manager—\$495, Deluxe PM for professional manager—\$1,195, Multi-User with Novell network compatibility—\$2,395. Includes check writing, recurring expenses, G.I. management reporting.
YARON SYSTEMS, INC.
813 Redrock St.
Santa Barbara, CA 93103
805-966-3666

PROPERTY MANAGEMENT

Rental-Use. New state of the art property management software. Extremely fast and easy to use. Everything is included, tenant tracking, repairs and maintenance, income and expense check writing. No extra modules to buy. The ultimate in property management. \$695 complete. Free brochure. Demo \$10.
STRATEGIC OFFICE SYSTEMS
9125 Mallard Circle
Sandy, UT 84093
800-942-6784 or 801-942-6784

PROPERTY MANAGEMENT

Since 1978 over 6,500 users of our software have found it comprehensive, flexible and easy to use. We offer systems to manage the following types of properties: COMMERCIAL/RESIDENTIAL/CONDOMINIUM/HOMEOWNERS ASSOC./MINI-STORAGE FACILITIES.
For more info and sample printouts call:
REALTY AUTOMATION
11365 East Shore Drive
Hayden Lake, ID 83835
(208) 772-3259

RELIGION

PARISH DATA SYSTEM™

Comprehensive census/contribution program. Easy to operate, menu driven. Family, member, financial info & reports fully integrated. Selective lists, labels, contribution/nation statements, personalized letters. User can create own reports, letters. Other church programs available. Over 2600 users. Free info.
Parish Data Systems, Inc.
3031 W. Northern Ave., Suite 121
Phoenix, AZ 85051
(602) 247-3341

RELIGION

CHURCH SOFTWARE

More churches choose **PowerChurch Plus** for their membership, contributions & accounting needs than ANY other church software package. Discover why the best value package is also the top performer & the most in use. Call today for your FREE full-featured DEMO version.



F1 Software, P.O. Box 2008, Beverly Hills, CA 90212
(213) 854-0885

CIRCLE 789 ON READER SERVICE CARD

"Quick, Complete and Easy"
3 reasons why Bible Quest is
rated the **best software** for
Bible study

Bible Quest

- search by word(s), phrase or reference
 - Expand your knowledge
 - your request is located instantly in full context
- Answers you've always wanted
• works with most word processors
• A unique learning tool
• requires 640K, 2.1 MB Hard Disk, and DOS 2.1 or later
Unlock the potential of the Bible in your life

Bible Quest

(King James Version)
An InfoQuest Product

Call 800-336-6644
Free color brochure
Order your own copy
\$99 + \$5 handling and shipping
(Visa, MasterCard or American Express accepted)
CIRCLE 790 ON READER SERVICE CARD

SCRIPTURE SCANNER BIBLE ON DISKS

- Search the Bible in seconds for key words or phrases.
 - Print any list or portion.
 - Write sermons, lessons, etc. from your word processor or disks with access to scripture.
- Special: \$99.95 & up
CALL: 512-255-9569

OMEGA
SOFTWARE
Box 265, Round Rock, TX 78680
CIRCLE 791 ON READER SERVICE CARD

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call
(212) 503-5115 or
(800) 825-14DS

ENAS COMPUTER BIBLE™ Version 2.0 New American Standard The best of the best writers

- For IBM and 100% Compatible
- Instantly searches text for any word or phrase.
 - Allows verses to be saved for use with word processors.
 - Also includes windowing capability.

Mail check or money order to:
Foundation Press Publications
P.O. Box 6439
Amen, CA 95816
(714) 636-6692
\$129.95 (CA orders add 6% tax)
plus \$4.00 shipping & handling

CIRCLE 792 ON READER SERVICE CARD

SALES MARKETING

New! SaleMaker™ Plus

Sales and Marketing Software System

- All New Version 2.0 now shipping
- Hundreds of powerful NEW features
- User-customizable for any business
- Inbound & outbound telemarketing
- Direct marketing, Full Mail Merge
- Search ALL fields for target marketing
- Unlimited Notes and Contacts
- Schedules calls and call-backs
- Autodials your phone
- Contact history, Management reports
- Laser Printer interface
- Instant follow-up letters & labels
- Pop-up windows, full color screens
- Unlimited file capacity with no loss in speed
- Imports & exports ASCII files
- 87+ data fields plus unlimited windows
- Single-user & true LAN versions available
- Module for unattended remote data transfer

PC MAGAZINE
The best just got better!
SaleMaker's new Plus version is packed with new features that make it state of the art software for sales and marketing.

Marketing is everyone's business and SaleMaker Plus should be everyone's choice for marketing software!

Call for FREE literature on this exciting NEW software!
1-800-433-5355
(214) 254-2626 in Texas
SaleMaker Software
Box 531650 Grand Prairie TX 75053

©1988 1987 Award for Technical Excellence
PC Magazine Editor's Choice, 12/22/87

CIRCLE 793 ON READER SERVICE CARD

SCIENTIFIC

TURN YOUR PC INTO A WEATHER STATION . . . IN MINUTES!



Only \$249.00

To order, please call:
1-800-347-5713

T.M.I. Inc.

4000 Evans Way Pl., 2-120, Lake Oswego, OR 97031

*For info. & in Oregon, call 503-655-3966

CIRCLE 794 ON READER SERVICE CARD

Add PC Weather to your IBM PC, XT, AT or compatible and your computer will keep a constant and wonderful eye on local weather conditions, while you work on word processing, spreadsheets, or programming. With the new PRO II Expanded Software Option, your computer even performs data logging. The PCW includes all weather sensors and mounting hardware, plug-in computer card, software, VU adapter, and complete on-line help screen documentation to change your computer into a personal weather station.

The PCW offers some all-tilt and much!

- Barometer
- Wind Speed
- Speed Alarm
- Wind Gust Record
- Wind Direction
- Wind Chill Factor
- Dry Bulb Temperature
- Wet Bulb Temperature
- Hi/Low Temp Alarm
- Hi/Low Temp Record
- Four Year Calendar
- 1324 Times & Alarm
- Dry Bulb Temperature

*With the optional RG-1 Base Collector

MADE IN U.S.A.

VISA, MC, AND AMEX

SECURITY

The PC Protector Password \$99



- Protect your valuable data
- Control licensed software
- Secure hard disk
- Restrict floppy access
- Menu driven maintenance
- Login without password
- Audit trail of activity

Fax: MC, Amex

PH: (204) 896-2702

VISA: (204) 943-3702

NASDEC

2704 - 85 Garry St

Winnipeg, MB Canada

R3C 4A5

CIRCLE 795 ON READER SERVICE CARD

VIRUS-PRO

Professional virus protection for IBM-compatible MS-DOS PCs. Tracks EXE, SYS, COM, BAT & hidden files on all logical drives. Keeps complete software configuration records. Find existing infections quickly and reliably! Use prompt to guide recovery. Safe and easy to use. Nontoxic. Valuable User Manual.

\$49.95 + \$3.5 & H.

Int'l Security Tech., Inc.
515 Madison Ave., N.Y. NY 10022
(212) 288-3101

CIRCLE 796 ON READER SERVICE CARD

SECURITY

STOP SOFTWARE PIRACY

With our Copy Protection Products. They really work and do not burden the honest user...

For Hardware Based Security (Parallel Port/ROM Socket Interface)

- STANDARD KEY TAG
- UNLIMITED executions
- COUPON KEY TAG
- LIMITED executions
- DURATION KEY TAG
- Limited (days, hours, min.)



For Disk Security

- HIGH Level Security
- PADLOCK II DISK
- SAFEGUARD DISKS
- COUPON DISKS

For Hard Disk Protection

- HD-COPY

Low Level Security

- User Installable Protection
- PC-PADLOCK

The market is filled with copy protection products which burden the user or simply don't work. We have over 3500 satisfied software firms utilizing our systems. The high-level fingerprint has not required an update in over 3 years.

Why should your valuable data or useful software program become available in the Public Domain?

Call or write for more information.

GLENCO

ENGINEERING INC.
SERVING THE SOFTWARE INDUSTRY SINCE 1979
723 W. Main Street, Suite 101, 018, 018-364-5077
Amherst, MA 01005
FAX 018-364-5080
Telex 493-7199

CIRCLE 797 ON READER SERVICE CARD

The world's leading software manufacturers depend on Softguard copy protection systems. Your FREE DISKETTE introduces you to SuperLock™ - invisible copy protection for IBM-PC (and compatibles) and Macintosh.

- Hard disk support
- No source code changes
- Customized versions
- LAN support
- New upgrades available

(408) 773-9680

SOFTGUARD SYSTEMS INC.

710 Lakeside, Suite 200

Sunnyvale, California 94086

FAX (408) 773-1405

CIRCLE 798 ON READER SERVICE CARD

SOFTGUARD

EVERLOCK

COPY PROTECTION

Designed for user transparency, clone compatibility & strength. It features:

- no need for damaged media or I/O plugs
- installs all Bit-copy Software
- supports all Hard & Floppy Disk formats
- restrict or allow Network installs
- allows protected upgrades by medium BIOS
- limits program use by date or all-circuits
- remotely reset installs or Expiration

\$195 Starter Kit or \$495 with NO meter counts. Free info & demo disk available

AZ Az-Tech Software, Inc.
305 East Franklin
Richmond MO 64085
(800) 227-0644 (816) 776-2790

CIRCLE 799 ON READER SERVICE CARD

SOFTWARE COPY PROTECTION

- Installs easily on your IBM-PC software
- Deletes all disk copy software
- Supports all Hard & Floppy disk formats
- Requires NO special devices or disks
- Invisible to your end user

Each disk protects two programs of your \$25 Starter kit & NO meter count packages \$99 + L.Tech Corporation

377 Route 17 South, Suite 618

Hasbrouck Heights, NJ 07604

(201) 706-4000 (201) 706-4111 (201) 706-4196

MARKETPLACE

SECURITY

HANDS OFF THE PROGRAM® PC SECURITY

HANDS OFF THE PROGRAM is an all software privilege based, system security utility that prevents unauthorized access of your PC's subroutines, files and disk drives.

HANDS OFF THE PROGRAM provides a sophisticated technique to require up to 16 users of a PC by providing each user their own separate areas on the hard disk. Users may access only their own areas and any other areas protected with a lower privilege.

HANDS OFF THE PROGRAM protects files on your hard disk by preventing unauthorized users from modifying the DOS file attributes (Read Only, Hidden, System). For example, use the READ ONLY attribute to prevent virus programs from modifying your system.

HANDS OFF THE PROGRAM restricts access to your hard disk via "link locking." A "locked" hard disk may not be located, accessed by application software or formatted via the DOS FORMAT command and is "unlocked."

HANDS OFF THE PROGRAM incorporates advanced security techniques on PC's running PC DOS V3.0 or higher. The DOS FORMAT or Drive C is prevented while the PC is in use. The security manager is protected against Control Break and is boot from floppy. Reports on the automatic locking of Drive C.

HANDS OFF THE PROGRAM also provides:

- Data Encryption
- User Access Reporting
- Shared Common Viruses
- Mailbox
- Read Only and Execute Only privileges by user
- Anti Installation

Price **\$89.95**

AT 871-871-871

Check Money Order VISA MC accepted
Systems Consulting Inc.
412-963-1624

Box 11009, Pittsburgh, PA 15238-0609
CIRCLE 800 ON READER SERVICE CARD

PC Security Products Hardware/Software

LogSafe Access Protection
WorkSafe Back-up Protection
ComSafe Modem Protection
CodeSafe H/W Copy Protection
VirusSafe Virus Protection
DataSafe Data Protection
DemoSafe Demo Protection

Gamma Security Products
70 Wilbur Blvd., #509, Santa Monica
California 90401 Tel: 213/994-2622
FAX: 213/994-4241 Tel: 510/6808753
Brochures & Demos available

CIRCLE 801 ON READER SERVICE CARD

BIT-LOCK™ SECURITY

Pracy SURVIVAL, 5 YEARS proves effectiveness of powerful multilayered security. Rapid decryption algorithms. Reliable security device transparent to PARALLEL or SERIAL port. Complemented by low cost KEY-LOCK™ multifaceted COMPU-LOCK™ including countdown, time-out, data encoding & multi-product protection. MICROCOMPUTER APPLICATIONS
3167 S. Glen Circle
London, CO 80122
(303) 922-6410 or 770-1863

STATISTICS

RATS Version 3.00!!!

RATS is an integrated environment for data analysis, forecasting and graphics. Forecast with Box-Jenkins (ARIMA), exponential smoothing, vector autoregressions, large models and others. Choose from a wide variety of techniques to analyze your data, from stepwise regression to local and probit, from two-stage least squares to spectral analysis. Generate reports using the excellent graphics and data-handling capabilities.

Our newest release (3.00) is more interactive than ever, with full help at the touch of <F1>. The power of RATS, in a new, improved form, is still yours for only \$300!!! Call or write for more information today.

VAR Econometrics
P.O. Box 1818
Evanston, IL 60204

(800) 822-6638 / (312) 864-8772
CIRCLE 802 ON READER SERVICE CARD

THE BASS SYSTEM™

DATA WYSTUDY
INFILTE WHTS.
LENGTH SER 5 1:
INPUT AGE 1 5 8 TO SEX 5
2 28 HEIGHT WEIGHT 35-37:
FORMAT AGE 5 5 HEIGHT WEIGHT 3 5 6.

PROC BLW DATA-WYSTUDY:
CLASS SER
MODEL WEIGHT - HEIGHT AGE SEX.

The BASS SYSTEM (our product) took 25 seconds, 384K, and 1.2 Meg of disk space. If costs \$399 one time, with occasional updates at \$35. Dataset was 1,000 observations.

BASS INSTITUTE, INC. P.O. BOX 349 CHAPEL HILL, NC 27514 (919) 933-7096

CIRCLE 803 ON READER SERVICE CARD

High performance STATISTICAL SYSTEM

STATS+

A powerful, elegant, and super-fast statistical package integrated with complete data management and dynamic graphs. Comprehensive selection of descriptive, inferential, and exploratory statistics with forecasting. STATS+ features intelligent, two-way interfaces to data from Lotus, Symphony, dBase, and other programs. For more info look for our ads in most computer journals, ask your dealer, or contact StatSoft. Price \$245 (+\$5 ship/handl).



StatSoft

2325 E. 13th St., Tulsa, OK 74104
(918) 583-4168
Overseas offices: StatSoft of Europe (Hamburg FRG) tel: 040-400347 StatSoft UK (London UK) tel: 0707 711569 Hevner Software (Melbourne Australia) tel: 833-467-4278

CIRCLE 804 ON READER SERVICE CARD

GO with SOLO

Ideal for researchers and business professionals. SOLO provides all the necessary statistical procedures. Incredibly easy to use. Inexpensive enough for a single project or occasional use. \$149 complete with graphics. Call today. MC or VISA. Satisfaction guaranteed!!

BMDP STATISTICAL SOFTWARE

1440 Sepulveda Boulevard
Los Angeles, CA 90025
(213) 479-7799

CIRCLE 806 ON READER SERVICE CARD

NCSS plus-\$99

Easy-to-use menus & spread sheet. Multiple regression. Tests: ANOVA up to 10 factors, ntp measures, covariance. Homogeneity Factor cluster & discriminant analysis. Nonparametrics. Cross-tabulation Plots. Histograms. Box scatter. Stemplot. Sort Subset Transformations. Reads ASCII. New graphics. Pkg \$99

NCSS

865 East 400 North
Kaysville, UT 84037
Phone: 801-546-0445

STAT PLAN III

Easiest to use statistics program available. Complete range of statistics: curve fitting, cross-tabs, correlation, multiple regression, t-tests, etc. Graphics with printer/plotter output. Capable of handling over 50,000 data points, interfaced directly with Lotus files. Demo diskette available. MC/VISA only \$179. THE FUTURES GROUP-STAT PLAN III
75 Eastern Blvd. Dept C
Glastonbury CT 06033-1264
(203) 633-3501

STATISTIX - ONLY \$169!

STATISTIX is a powerful and very easy-to-use statistical system for PC's. Used by many universities, businesses, local and state governments and research organizations. Check us out before you buy a statistics program, you'll agree. SX is a "best buy" Money Back GUARANTEED. For more info: NH ANALYTICAL SOFTWARE
PO BOX 13204
Roseville, MN 55113
(612) 631-2852

SURVEYS

THE SURVEY SYSTEM

An easy to use menu driven system for the entry, editing, processing and presentation of questionnaire data. The system can produce camera ready cross-tabs and other tables in banner format. Also statistics and bar charts. Regression and open-end coding analysis options available.
CREATIVE RESEARCH SYSTEMS
15 Lone Oak Cir. Dept P
Petrelia, CA 90932
(707) 765-1001

A-CROSS - #1 IN CROSSTABS

Easiest & most powerful cross-tabs program for survey & research data. 16 built-in cases & 999 user cases. Read any ASCII or binary dBASE file. Process open tables to all printers. 1 laser outputs to ASCII & Lotus files. Full stats & t-test. chi-sq. Nominated for PC Mag Award for Tech Excellence.

STRAWBERRY SOFTWARE, INC.
42 Pleasant Street FREE DEMO DISK
Watertown, Massachusetts 02172
(800) 4 ACROSS FAX: (617) 926-0134

MARKETPLACE

TAXES

AM-TAX

If you have a PC, this is the way you should be preparing your 1988 income tax return. Fast, easy, & accurate. No spreadsheet software req'd. Thousands of satisfied users.

Regular Versions

Supports 18 schedules and forms (1040, A-SE, 2106, 2119, 2210, 2441, 3903, 4136, 4562, 6251, and 8615).

Prints IRS-approved forms and schedules, plus a graphic 1040 on Epson or IBM-type dot printers. Works with overlays and pin-fed forms. Requires IBM-comp. 256K.

Only \$45

NEW Advanced Versions

All of the regular features plus more forms (1040ES, 3800, 4137, 4255, 4684, 8582), and laser printed 1040 w/graphics on HP-type lasers. Req. 384K and two drives.

Only \$60

State programs for CA, NY, NJ, MD, MO, and VA. Data auto transferred from federal tax forms. \$30 each.

MC/Visa. 30-day guarantee.

AM SOFTWARE

P.O. Box 25018

Kansas City, MO 64119

(816) 241-0014

CIRCLE 807 ON READER SERVICE CARD

PC Magazine Marketplace
the ultimate target
market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call
(212) 503-5115 or
(800) 825-44DS

UTILITIES

Announcing A Menu System So Appetizing,
You'll Want To Take 30,000 Bytes.

Take one look at the Automenu Software Management System, and you'll agree that there's no better menu into the world of computer software. Automenu increases computer productivity by eliminating the need for complicated DOS training and commands. To order Automenu for only \$50, call 1-800-662-4330. Or visit the dealer nearest you.



MAGEE ENTERPRISES, INC.
404-446-6611/CompuServe 70167,1230
FAX 404-368-0719/BBS 404-446-6650

Automenu

The First Menu System, And Still The Best.

For MS-DOS 2.00, 2.05, 3.00, 3.10, 3.30, 4.00, 4.01, 4.02, 4.03, 4.04, 4.05, 4.06, 4.07, 4.08, 4.09, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 4.38, 4.39, 4.40, 4.41, 4.42, 4.43, 4.44, 4.45, 4.46, 4.47, 4.48, 4.49, 4.50, 4.51, 4.52, 4.53, 4.54, 4.55, 4.56, 4.57, 4.58, 4.59, 4.60, 4.61, 4.62, 4.63, 4.64, 4.65, 4.66, 4.67, 4.68, 4.69, 4.70, 4.71, 4.72, 4.73, 4.74, 4.75, 4.76, 4.77, 4.78, 4.79, 4.80, 4.81, 4.82, 4.83, 4.84, 4.85, 4.86, 4.87, 4.88, 4.89, 4.90, 4.91, 4.92, 4.93, 4.94, 4.95, 4.96, 4.97, 4.98, 4.99, 5.00, 5.01, 5.02, 5.03, 5.04, 5.05, 5.06, 5.07, 5.08, 5.09, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 5.16, 5.17, 5.18, 5.19, 5.20, 5.21, 5.22, 5.23, 5.24, 5.25, 5.26, 5.27, 5.28, 5.29, 5.30, 5.31, 5.32, 5.33, 5.34, 5.35, 5.36, 5.37, 5.38, 5.39, 5.40, 5.41, 5.42, 5.43, 5.44, 5.45, 5.46, 5.47, 5.48, 5.49, 5.50, 5.51, 5.52, 5.53, 5.54, 5.55, 5.56, 5.57, 5.58, 5.59, 5.60, 5.61, 5.62, 5.63, 5.64, 5.65, 5.66, 5.67, 5.68, 5.69, 5.70, 5.71, 5.72, 5.73, 5.74, 5.75, 5.76, 5.77, 5.78, 5.79, 5.80, 5.81, 5.82, 5.83, 5.84, 5.85, 5.86, 5.87, 5.88, 5.89, 5.90, 5.91, 5.92, 5.93, 5.94, 5.95, 5.96, 5.97, 5.98, 5.99, 6.00, 6.01, 6.02, 6.03, 6.04, 6.05, 6.06, 6.07, 6.08, 6.09, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.23, 6.24, 6.25, 6.26, 6.27, 6.28, 6.29, 6.30, 6.31, 6.32, 6.33, 6.34, 6.35, 6.36, 6.37, 6.38, 6.39, 6.40, 6.41, 6.42, 6.43, 6.44, 6.45, 6.46, 6.47, 6.48, 6.49, 6.50, 6.51, 6.52, 6.53, 6.54, 6.55, 6.56, 6.57, 6.58, 6.59, 6.60, 6.61, 6.62, 6.63, 6.64, 6.65, 6.66, 6.67, 6.68, 6.69, 6.70, 6.71, 6.72, 6.73, 6.74, 6.75, 6.76, 6.77, 6.78, 6.79, 6.80, 6.81, 6.82, 6.83, 6.84, 6.85, 6.86, 6.87, 6.88, 6.89, 6.90, 6.91, 6.92, 6.93, 6.94, 6.95, 6.96, 6.97, 6.98, 6.99, 7.00, 7.01, 7.02, 7.03, 7.04, 7.05, 7.06, 7.07, 7.08, 7.09, 7.10, 7.11, 7.12, 7.13, 7.14, 7.15, 7.16, 7.17, 7.18, 7.19, 7.20, 7.21, 7.22, 7.23, 7.24, 7.25, 7.26, 7.27, 7.28, 7.29, 7.30, 7.31, 7.32, 7.33, 7.34, 7.35, 7.36, 7.37, 7.38, 7.39, 7.40, 7.41, 7.42, 7.43, 7.44, 7.45, 7.46, 7.47, 7.48, 7.49, 7.50, 7.51, 7.52, 7.53, 7.54, 7.55, 7.56, 7.57, 7.58, 7.59, 7.60, 7.61, 7.62, 7.63, 7.64, 7.65, 7.66, 7.67, 7.68, 7.69, 7.70, 7.71, 7.72, 7.73, 7.74, 7.75, 7.76, 7.77, 7.78, 7.79, 7.80, 7.81, 7.82, 7.83, 7.84, 7.85, 7.86, 7.87, 7.88, 7.89, 7.90, 7.91, 7.92, 7.93, 7.94, 7.95, 7.96, 7.97, 7.98, 7.99, 8.00, 8.01, 8.02, 8.03, 8.04, 8.05, 8.06, 8.07, 8.08, 8.09, 8.10, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.17, 8.18, 8.19, 8.20, 8.21, 8.22, 8.23, 8.24, 8.25, 8.26, 8.27, 8.28, 8.29, 8.30, 8.31, 8.32, 8.33, 8.34, 8.35, 8.36, 8.37, 8.38, 8.39, 8.40, 8.41, 8.42, 8.43, 8.44, 8.45, 8.46, 8.47, 8.48, 8.49, 8.50, 8.51, 8.52, 8.53, 8.54, 8.55, 8.56, 8.57, 8.58, 8.59, 8.60, 8.61, 8.62, 8.63, 8.64, 8.65, 8.66, 8.67, 8.68, 8.69, 8.70, 8.71, 8.72, 8.73, 8.74, 8.75, 8.76, 8.77, 8.78, 8.79, 8.80, 8.81, 8.82, 8.83, 8.84, 8.85, 8.86, 8.87, 8.88, 8.89, 8.90, 8.91, 8.92, 8.93, 8.94, 8.95, 8.96, 8.97, 8.98, 8.99, 9.00, 9.01, 9.02, 9.03, 9.04, 9.05, 9.06, 9.07, 9.08, 9.09, 9.10, 9.11, 9.12, 9.13, 9.14, 9.15, 9.16, 9.17, 9.18, 9.19, 9.20, 9.21, 9.22, 9.23, 9.24, 9.25, 9.26, 9.27, 9.28, 9.29, 9.30, 9.31, 9.32, 9.33, 9.34, 9.35, 9.36, 9.37, 9.38, 9.39, 9.40, 9.41, 9.42, 9.43, 9.44, 9.45, 9.46, 9.47, 9.48, 9.49, 9.50, 9.51, 9.52, 9.53, 9.54, 9.55, 9.56, 9.57, 9.58, 9.59, 9.60, 9.61, 9.62, 9.63, 9.64, 9.65, 9.66, 9.67, 9.68, 9.69, 9.70, 9.71, 9.72, 9.73, 9.74, 9.75, 9.76, 9.77, 9.78, 9.79, 9.80, 9.81, 9.82, 9.83, 9.84, 9.85, 9.86, 9.87, 9.88, 9.89, 9.90, 9.91, 9.92, 9.93, 9.94, 9.95, 9.96, 9.97, 9.98, 9.99, 10.00, 10.01, 10.02, 10.03, 10.04, 10.05, 10.06, 10.07, 10.08, 10.09, 10.10, 10.11, 10.12, 10.13, 10.14, 10.15, 10.16, 10.17, 10.18, 10.19, 10.20, 10.21, 10.22, 10.23, 10.24, 10.25, 10.26, 10.27, 10.28, 10.29, 10.30, 10.31, 10.32, 10.33, 10.34, 10.35, 10.36, 10.37, 10.38, 10.39, 10.40, 10.41, 10.42, 10.43, 10.44, 10.45, 10.46, 10.47, 10.48, 10.49, 10.50, 10.51, 10.52, 10.53, 10.54, 10.55, 10.56, 10.57, 10.58, 10.59, 10.60, 10.61, 10.62, 10.63, 10.64, 10.65, 10.66, 10.67, 10.68, 10.69, 10.70, 10.71, 10.72, 10.73, 10.74, 10.75, 10.76, 10.77, 10.78, 10.79, 10.80, 10.81, 10.82, 10.83, 10.84, 10.85, 10.86, 10.87, 10.88, 10.89, 10.90, 10.91, 10.92, 10.93, 10.94, 10.95, 10.96, 10.97, 10.98, 10.99, 11.00, 11.01, 11.02, 11.03, 11.04, 11.05, 11.06, 11.07, 11.08, 11.09, 11.10, 11.11, 11.12, 11.13, 11.14, 11.15, 11.16, 11.17, 11.18, 11.19, 11.20, 11.21, 11.22, 11.23, 11.24, 11.25, 11.26, 11.27, 11.28, 11.29, 11.30, 11.31, 11.32, 11.33, 11.34, 11.35, 11.36, 11.37, 11.38, 11.39, 11.40, 11.41, 11.42, 11.43, 11.44, 11.45, 11.46, 11.47, 11.48, 11.49, 11.50, 11.51, 11.52, 11.53, 11.54, 11.55, 11.56, 11.57, 11.58, 11.59, 11.60, 11.61, 11.62, 11.63, 11.64, 11.65, 11.66, 11.67, 11.68, 11.69, 11.70, 11.71, 11.72, 11.73, 11.74, 11.75, 11.76, 11.77, 11.78, 11.79, 11.80, 11.81, 11.82, 11.83, 11.84, 11.85, 11.86, 11.87, 11.88, 11.89, 11.90, 11.91, 11.92, 11.93, 11.94, 11.95, 11.96, 11.97, 11.98, 11.99, 12.00, 12.01, 12.02, 12.03, 12.04, 12.05, 12.06, 12.07, 12.08, 12.09, 12.10, 12.11, 12.12, 12.13, 12.14, 12.15, 12.16, 12.17, 12.18, 12.19, 12.20, 12.21, 12.22, 12.23, 12.24, 12.25, 12.26, 12.27, 12.28, 12.29, 12.30, 12.31, 12.32, 12.33, 12.34, 12.35, 12.36, 12.37, 12.38, 12.39, 12.40, 12.41, 12.42, 12.43, 12.44, 12.45, 12.46, 12.47, 12.48, 12.49, 12.50, 12.51, 12.52, 12.53, 12.54, 12.55, 12.56, 12.57, 12.58, 12.59, 12.60, 12.61, 12.62, 12.63, 12.64, 12.65, 12.66, 12.67, 12.68, 12.69, 12.70, 12.71, 12.72, 12.73, 12.74, 12.75, 12.76, 12.77, 12.78, 12.79, 12.80, 12.81, 12.82, 12.83, 12.84, 12.85, 12.86, 12.87, 12.88, 12.89, 12.90, 12.91, 12.92, 12.93, 12.94, 12.95, 12.96, 12.97, 12.98, 12.99, 13.00, 13.01, 13.02, 13.03, 13.04, 13.05, 13.06, 13.07, 13.08, 13.09, 13.10, 13.11, 13.12, 13.13, 13.14, 13.15, 13.16, 13.17, 13.18, 13.19, 13.20, 13.21, 13.22, 13.23, 13.24, 13.25, 13.26, 13.27, 13.28, 13.29, 13.30, 13.31, 13.32, 13.33, 13.34, 13.35, 13.36, 13.37, 13.38, 13.39, 13.40, 13.41, 13.42, 13.43, 13.44, 13.45, 13.46, 13.47, 13.48, 13.49, 13.50, 13.51, 13.52, 13.53, 13.54, 13.55, 13.56, 13.57, 13.58, 13.59, 13.60, 13.61, 13.62, 13.63, 13.64, 13.65, 13.66, 13.67, 13.68, 13.69, 13.70, 13.71, 13.72, 13.73, 13.74, 13.75, 13.76, 13.77, 13.78, 13.79, 13.80, 13.81, 13.82, 13.83, 13.84, 13.85, 13.86, 13.87, 13.88, 13.89, 13.90, 13.91, 13.92, 13.93, 13.94, 13.95, 13.96, 13.97, 13.98, 13.99, 14.00, 14.01, 14.02, 14.03, 14.04, 14.05, 14.06, 14.07, 14.08, 14.09, 14.10, 14.11, 14.12, 14.13, 14.14, 14.15, 14.16, 14.17, 14.18, 14.19, 14.20, 14.21, 14.22, 14.23, 14.24, 14.25, 14.26, 14.27, 14.28, 14.29, 14.30, 14.31, 14.32, 14.33, 14.34, 14.35, 14.36, 14.37, 14.38, 14.39, 14.40, 14.41, 14.42, 14.43, 14.44, 14.45, 14.46, 14.47, 14.48, 14.49, 14.50, 14.51, 14.52, 14.53, 14.54, 14.55, 14.56, 14.57, 14.58, 14.59, 14.60, 14.61, 14.62, 14.63, 14.64, 14.65, 14.66, 14.67, 14.68, 14.69, 14.70, 14.71, 14.72, 14.73, 14.74, 14.75, 14.76, 14.77, 14.78, 14.79, 14.80, 14.81, 14.82, 14.83, 14.84, 14.85, 14.86, 14.87, 14.88, 14.89, 14.90, 14.91, 14.92, 14.93, 14.94, 14.95, 14.96, 14.97, 14.98, 14.99, 15.00, 15.01, 15.02, 15.03, 15.04, 15.05, 15.06, 15.07, 15.08, 15.09, 15.10, 15.11, 15.12, 15.13, 15.14, 15.15, 15.16, 15.17, 15.18, 15.19, 15.20, 15.21, 15.22, 15.23, 15.24, 15.25, 15.26, 15.27, 15.28, 15.29, 15.30, 15.31, 15.32, 15.33, 15.34, 15.35, 15.36, 15.37, 15.38, 15.39, 15.40, 15.41, 15.42, 15.43, 15.44, 15.45, 15.46, 15.47, 15.48, 15.49, 15.50, 15.51, 15.52, 15.53, 15.54, 15.55, 15.56, 15.57, 15.58, 15.59, 15.60, 15.61, 15.62, 15.63, 15.64, 15.65, 15.66, 15.67, 15.68, 15.69, 15.70, 15.71, 15.72, 15.73, 15.74, 15.75, 15.76, 15.77, 15.78, 15.79, 15.80, 15.81, 15.82, 15.83, 15.84, 15.85, 15.86, 15.87, 15.88, 15.89, 15.90, 15.91, 15.92, 15.93, 15.94, 15.95, 15.96, 15.97, 15.98, 15.99, 16.00, 16.01, 16.02, 16.03, 16.04, 16.05, 16.06, 16.07, 16.08, 16.09, 16.10, 16.11, 16.12, 16.13, 16.14, 16.15, 16.16, 16.17, 16.18, 16.19, 16.20, 16.21, 16.22, 16.23, 16.24, 16.25, 16.26, 16.27, 16.28, 16.29, 16.30, 16.31, 16.32, 16.33, 16.34, 16.35, 16.36, 16.37, 16.38, 16.39, 16.40, 16.41, 16.42, 16.43, 16.44, 16.45, 16.46, 16.47, 16.48, 16.49, 16.50, 16.51, 16.52, 16.53, 16.54, 16.55, 16.56, 16.57, 16.58, 16.59, 16.60, 16.61, 16.62, 16.63, 16.64, 16.65, 16.66, 16.67, 16.68, 16.69, 16.70, 16.71, 16.72, 16.73, 16.74, 16.75, 16.76, 16.77, 16.78, 16.79, 16.80, 16.81, 16.82, 16.83, 16.84, 16.85, 16.86, 16.87, 16.88, 16.89, 16.90, 16.91, 16.92, 16.93, 16.94, 16.95, 16.96, 16.97, 16.98, 16.99, 17.00, 17.01, 17.02, 17.03, 17.04, 17.05, 17.06, 17.07, 17.08, 17.09, 17.10, 17.11, 17.12, 17.13, 17.14, 17.15, 17.16, 17.17, 17.18, 17.19, 17.20, 17.21, 17.22, 17.23, 17.24, 17.25, 17.26, 17.27, 17.28, 17.29, 17.30, 17.31, 17.32, 17.33, 17.34, 17.35, 17.36, 17.37, 17.38, 17.39, 17.40, 17.41, 17.42, 17.43, 17.44, 17.45, 17.46, 17.47, 17.48, 17.49, 17.50, 17.51, 17.52, 17.53, 17.54, 17.55, 17.56, 17.57, 17.58, 17.59, 17.60, 17.61, 17.62, 17.63, 17.64, 17.65, 17.66, 17.67, 17.68, 17.69, 17.70, 17.71, 17.72, 17.73, 17.74, 17.75, 17.76, 17.77, 17.78, 17.79, 17.80, 17.81, 17.82, 17.83, 17.84, 17.85, 17.86, 17.87, 17.88, 17.89, 17.90, 17.91, 17.92, 17.93, 17.94, 17.95, 17.96, 17.97, 17.98, 17.99, 18.00, 18.01, 18.02, 18.03, 18.04, 18.05, 18.06, 18.07, 18.08, 18.09, 18.10, 18.11, 18.12, 18.13, 18.14, 18.15, 18.16, 18.17, 18.18, 18.19, 18.20, 18.21, 18.22, 18.23, 18.24, 18.25, 18.26, 18.27, 18.28, 18.29, 18.30, 18.31, 18.32, 18.33, 18.34, 18.35, 18.36, 18.37, 18.38, 18.39, 18.40, 18.41, 18.42, 18.43, 18.44, 18.45, 18.46, 18.47, 18.48, 18.49, 18.50, 18.51, 18.52, 18.53, 18.54, 18.55, 18.56, 18.57, 18.58, 18.59, 18.60, 18.61, 18.62, 18.63, 18.64, 18.65, 18.66, 18.67, 18.68, 18.69, 18.70, 18.71, 18.72, 18.73, 18.74, 18.75, 18.76, 18.77, 18.78, 18.79, 18.80, 18.81, 18.82, 18.83, 18.84, 18.85, 18.86, 18.87, 18.88, 18.89, 18.90, 18.91, 18.92, 18.93, 18.94, 18.95, 18.96, 18.97, 18.98, 18.99, 19.00, 19.01, 19.02, 19.03, 19.04, 19.05, 19.06, 19.07, 19.08, 19.09, 19.10, 19.11, 19.12, 19.13, 19.14, 19.15, 19.16, 19.17, 19.18, 19.19, 19.20, 19.21, 19.22, 19.23, 19.24, 19.25, 19.26, 19.27, 19.28, 19.29, 19.30, 19.31, 19.32, 19.33, 19.34, 19.35, 19.36, 19.37, 19.38, 19.39, 19.40, 19.41, 19.42, 19.43, 19.44, 19.45, 19.46, 19.47, 19.48, 19.49, 19.50, 19.51, 19.52, 19.53, 19.54, 19.55, 19.56, 19.57, 19.58, 19.59, 19.60, 19.61, 19.62, 19.63, 19.64, 19.65, 19.66, 19.67, 19.68, 19.69, 19.70, 19.71, 19.72, 19.73, 19.74, 19.75, 19.76, 19.

MARKETPLACE

UTILITIES

RUNNING OUT OF MEMORY?

- LIM EMS 4.0 for PC/XT/AT**
- No expensive memory boards required—uses memory that goes unused on most systems
 - Works with 1-2.3, Symphony, DOS 4.0, Windows, and many others
 - PC/XT/286 AT and Special High Speed 386 AT versions all for one low price \$59.95
 - OEM pricing also available

BIOSys Software

1501 N. Broadway, Suite 270
Walnut Creek, CA 94596
(415) 933-7713

CIRCLE 816 ON READER SERVICE CARD

SOFTWARE SIMPLE TO USE!

Intexor: Minitext 39⁹⁵

Simple word processor for everybody!

Intexor: Calculator 29⁹⁵

Replace your desktop calculator!

For PC/XT/AT/286/PS/2 and compatibles

To Order Call: USA 1-800-663-8521

CANADA (804) 879-5445

Add \$4.00 Ship & Handling

Dealer & Dist. Please call (804) 879-5445

14 E. Broadway, Suite E, Holly #106

Vancouver, B.C. 604-681-1111

VST 114 WA 90225

Vine, M/C or Money Order

CIRCLE 818 ON READER SERVICE CARD

Ammunition to conquer your biggest problems!

with V-EMM (8 megabytes)



- The Virtual Expanded Memory Manager provides your EMS applications with up to eight megabytes of expanded memory
- It turns PC/AT or PS/2 extended memory into expanded memory
- It turns hard disk storage into expanded memory
- It's compatible with most EMS applications, including 1-2-3 and Symphony
- Only \$89.95 30-day money-back guarantee

Fort Software
P.O. Box 286
Mannheim, NJ 08050
(613) 537-2867

CIRCLE 816 ON READER SERVICE CARD

AT'S DON'T NEED 360KB DRIVES

Allows copying of IBM AT files for use on IBM PC/AT, XT, and compatibles with no hardware or software modifications. A 360KB floppy drive is not required. "COPYAT2PC" may reside on your IBM AT hard disk and copies 1 file or entire subdirectories in 1 step. Price \$79.95 \$4.50

MICROBRIDGE COMPUTERS INTERNATIONAL, INC.
655 Sky Way - Suite 125
San Carlos, CA 94070
1-800-523-8777
(CA) 415-593-8777



CIRCLE 817 ON READER SERVICE CARD

WORD PROCESSING

NEW! PC-WRITE 3.0

Full featured word processor for PCs. Edits large files and columns. Spell check, mail merge, ASCII and macros. Easy to use. Supports 500 printers. Software guide and tutorial on diskette. \$16 Registration with manual, tele-support, newsletters and updates \$89.00 90 day moneyback guarantee.

QUICKSOFT
219 First Ave North #224 PMAC
Seattle, WA 98109
1-800-888-8888 (206) 282-0452 Visa/MC

World's Bilingual Word

Douglas, bilingual word processor for English and Armenian, Bengali, Euro/Latin, Greek, Hindi, Khmer, Lao, Punjabi, Russian, Sinhala Tamil, Thai, Viet \$109 + \$5 s/h (foreign + \$12 s/h) Font editor included. For IBM compatible with dot-matrix & LaserJet printer. Demo \$6 + \$1 s/h
MegaChamp Company
3524 Cottman Avenue
Philadelphia, PA 19149-1606 USA
215-331-2748

XyMouse for XyWrite!

XyMouse... the lightning-fast enhanced... makes XyWrite II Plus even better! Accelerates both beginning and advanced typists' users.

XyMouse... enables you to use powerful XyWrite commands without reaching for the mouse, as when you use XyWrite.

XyMouse... moves cursor smoothly and exactly. Selects from dots at corners with single mouse movement. Includes fast file directory control, or to extend on-line help system, runs with MacDraw and releases.

Call 800 for the XyMouse Converter
GALACTIC 3077/76647
2600 Philadelphia Avenue, Suite 211
Haverhill, MA 01830
215-647-0530

CIRCLE 818 ON READER SERVICE CARD

PC Magazine Marketplace

2nd Color Option Available

WORD PROCESSING

CompareRite™

"Outstanding software - the best of its kind... CompareRite compares documents in ways that I didn't think were possible. It's utterly amazing."
- John Dvorak, PC Magazine, 3/15/88

CompareRite saves hours of editing by showing you how any two documents differ. Amazingly fast, CompareRite will create a complete comparison draft, ready for printing, or display the changes on the screen so you can scan them. The program shows changes in many user-selectable formats, and is compatible with all major word processing programs.

CompareRite is perfect for attorneys, editors, proofreaders or anyone who has to make or compare drafts. Thousands in use. Price — \$129.95 + \$5 shipping/handling

JURISOFT INCORPORATED

763 Massachusetts Avenue
Cambridge, MA 02139

(Outside MA) 800-262-5656 Ext. 10 (In MA) 617-864-6151 Ext. 10

CIRCLE 819 ON READER SERVICE CARD

MISCELLANEOUS/ACCESSORIES

CompuTogs Dust Covers

The ultimate in dust protection. Available in natural canvas-brown trim or new designer gray/black trim (add \$2-cover). Our covers are far superior to vinyl!



COMPARE OUR PRICES! MONITOR 15.95 PRINTER (typical) 15.95

KEYBOARD 13.95 MON-CPU 24.95

CompuTogs® P.O. Box 19728, Greensboro, NC 27419 (919) 292-9000

WDAAC Accepted. Includes \$2.50 Shipping. CUSTOM EMBROIDERY SHOWN AVAILABLE

CIRCLE 820 ON READER SERVICE CARD 1-800-227-TOGS

A MUST FOR COMPUTERS

VIZIFLEX SEALS



The only keyboard cover designed to remain securely in place at all times. It will not impede complete performance in any way. Over 150 models available for all kinds of keyboards.

VIZIFLEX SEALS, INC.

16 E. Lafayette St., Hackensack, NJ 07601
Tel (201) 487-8050 • Fax (201) 487-8637
Dealer Inquiries Invited

CIRCLE 821 ON READER SERVICE CARD



COVER YOUR INVESTMENT

DUST COVERS Over 400 designs in five colors

Clear, Black and Stainless Steel

Clear Plastic, Clear Stainless Steel

KeySkin® Keyboard Protectors 24-hour

Protection from dirt and oil

Clear to the eye and 100% in the

back. Over 100 models available

CALL FOR FREE CATALOG

ORDER DESK

(800) 874-0261

800-874-0261

DEALER INQUIRIES INVITED

CompuCovers

1000 Lakeside Drive

Fort Worth, Texas, P. 76104

Customer Service

(800) 874-0261

FAX (800) 874-0261

CIRCLE 822 ON READER SERVICE CARD

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4405

MARKETPLACE

ACCESSORIES

ComputerWear
100%
DUST COVERS
COTTON
CANVAS



Brushable Static-Free! Bags with Grey Ties for Computers, Keyboards, Printers & Lamps. All Popular Models. Superior Quality. Best Price.

NEW! Viz!Flex-Seals
SKINS for Keyboards



1-(800) 826-5761
ComputerWear
1320-36th Ave San Francisco CA 94122
CIRCLE 83 ON READER SERVICE CARD

BAR CODING

BAR CODES MADE EASY



PERCON® E-Z-READER™
FAST • ACCURATE • RUGGED

NO SOFTWARE CHANGES WITH PC XT/AT and PS/2, AT&T 6300, Wyse 3000/9000/486, Sun Microsystems K17PC, Unix PC/Terminal/UMC3, Televideo PC517/1050/955 & DEC VT220 keyboards, multi-user RS-232 interfaces

- Immediate shipment
- Free phone support
- 2-year warranty

Details or Questions? Call us.
(503) 344-1189
2710 W 11th Ave., Eugene, OR 97402

PERCON®

IMAGE COMPUTER SYSTEMS

Professional Labeling Software

- Memory-resident software prints bar codes, large text, boxes & lines directly from any program dBASE, BASIC, etc.
- Works with Dot Matrix or Laser printers.
- Any label format or size. A4/US etc.
- Includes easy-to-use menu-driven label design program.

\$295 complete
Call or write for FREE sample printout and brochure.

Image Computer Systems
124 Wellington Ave., Apt. CC 06301
(203) 678-8771

BAR CODE EXPRESS

LABELS




- Industry's Largest Selection
- Many Unique, Useful Features
- Direct from Manufacturer
- 30 Day \$\$ Back Guarantee
- Same Day Shipping

Labeling Software

- Print Big Text (Up to 2") & Bar Codes on PC and Compatibles
- On Dot Matrix (Epson, Oki, IBM) and Laserjet Printers
- Any Size—Flexible Format—FAST
- "Callable"—\$239 or Menu-Driven—\$279

Handheld Portables

- Simple, Powerful, 64K Memory
- Easily Programmable Prompts
- Uploads via RS-232 or Keyboard
- Bar Code and Keypad Input
- Doubles as Non-portable Reader
- Complete with Wand—\$849



Bar Code Readers for PC XT, AT & PS/2 and all RS-232 Terminals

- Attaches as 2nd Keyboard
- No Software Changes
- Reads 2of5, UPC, 128, Code 39
- Rugged, Stainless Steel Wand or Laser
- Complete with Wand—\$399

WORTHINGTON

DATA SOLUTIONS

417-A Ingalls Street
Santa Cruz, CA 95066

800-345-4220
CA 408-458-9938

Before scanning these , scan this.

Make your mark in automatic identification with ISD software solutions. Print all kinds of bar code labels on demand. Speed and simplify data collection. Track products dot-to-stock. And streamline inventory control.

Integrated Software Design, Inc., 171 Fortuna Blvd., Mansfield, MA 02048
Call (508) 339-4928 and ask to scan our catalog.



CIRCLE 824 ON READER SERVICE CARD

BAR CODING



Bar Code Solutions ON-LINE BAR CODE READER NETWORK

NEW PC-WAND 300 - up to 128 reader data collection system • Auto discriminates • Collects formats and transmits to PC or host

PC-WAND 800 WanderWand - programmable portable bar code readers

PC-WAND 200 - terminal wedge on a serial parity line for main's

PC-WAND 100 - emulates 2nd keyboard

NEW - bar code printing software packages for your printer

DEALER INQUIRIES INVITED

INTERNATIONAL TECHNOLOGIES & SYSTEMS CORP.

625 North Berry Street, Suite C, Brea, CA 92611

PHONE: 714 990-1880

FAX 714 990-2503

CIRCLE 825 ON READER SERVICE CARD

PrintBar II

BAR CODE PRINTING SOFTWARE

Print Code 39, 2 of 5, UPC, and EAN bar codes directly from your own applications without copying data to special print files. IBM PC/XT/AT/PS/2 and compatibles. Supports IBM Graphics, Epson and Laserjet printers and compatibles.

PrintBar II Program \$295.00

PrintBar II Demo \$25.00

Other Bar Code products available for non-MS-DOS environments.

Bar Code readers from \$395.00

FREE Brochure (VHS) 622-8540

FAX 916-622-4775

Bear Rock

SOFTWARE SOLUTIONS

6009 Enterprise Dr., Placerville, CA 95667

CIRCLE 826 ON READER SERVICE CARD

THE
SHOWCASE
FOR PRODUCTS
AND SERVICES
IN THE MS DOS
MARKET . . .

MARKETPLACE

BAR CODE READERS

NO SOFTWARE CHANGES REQUIRED
PCs:

- IBM PC/XT/AT PS/2 CLONES
- TANDY 1000SX/1200/3000/4000
- ZENITH 136/148/151/156/1248
- EPSON EQUITY 1 & II

TERMINALS:

- WYSE 50/60/75
- KIMTRON KT-7/PC
- CONTROL DATA VIKING 721
- TANDY 01100
- RS 232

PC/IMS DOS BAR CODE PRINTING SOFTWARE

RESELLER DISCOUNTS AVAILABLE

AMERICAN MICROSYSTEMS
1110 S AIRPORT CIRCLE, SUITE 140
EUREKA, TX 78040 (817) 571-9915
(800) 548-4452
FAX (817) 685-6232

EZBarcode™



\$289⁹⁵
Includes
EZBarcode I
Printing
Software

Bar Code Reader

Model PC-WEDGE Reader \$289.95
• No software charges necessary
• For PC/XT/AT or compatible
• Reads Code 39, 3 of 5, U.P.C., Codabar
• EZBarcode I printing software included

EZBarcode I Printing Program
(ordered separately) **\$49.95**
• Enter and print Code 39 and U.P.C.-A
• For dot matrix and LaserJet printers
• Very bar code height, spacing, etc.
EZBarcode II Printing Program \$99.95
• Keyboard or serial file data input
• Prints Code 39, Interleaved 2 of 5, U.P.C.-A
• Automatic incrementing, multiple columns
EZBarcode™ program prints bar codes
from within dBASE III Plus **\$99.00**

TimeKeeping Systems, Inc.
12414 A Cedar Road • Cleveland, OH 44106
(216) 229-2579 • Fax: (216) 229-2573

BAR CODE & MAGNETIC STRIPE READERS

for the IBM PC & PS/2

Simple & quick installation
No additional software or port
Mental ward & case

Also available:
Bar code printing software
Magnetic stripe encoders
Units for other computers & terminals
USA prices available

TPS ELECTRONICS
4047 Transport Road
Palo Alto, CA 94303
Telephone: 415-856-6833
Telex: (Graphnet) 371 0097 TPS PUA
FAX: 415-050-3843
CIRCLE 87 ON READER SERVICE CARD

BOOKS CATALOGUES PUBLICATIONS

PCjr Expansion Products

Possibly the largest selection of PCjr products in the country. We don't just sell PCjr products, we design them.

- Speed Up Products
- 1600k DMA Cartridges
- Second Floppy Disk Drives
- 3 1/2" Disk Drives
- PCjr Optical Mass
- Monitor Adapters for PC's
- Parallel Printer Ports
- Full Size Keyboards
- Speech Attachments
- 1600k Cables & Adapters

Call or write to receive our free 32-page catalog of PCjr Add-On products. For even faster results, circle our reader service number.

PC Enterprises
"The jrProducts Group"
Box 292, Belmar, NJ 07719
(201) 290-0025 (800) 822-PCJR
CIRCLE 88 ON READER SERVICE CARD

IBM PCjr SPECIALS

Full line of IBM PCjr Hardware
• Memory Expansions to 640k
• Second Floppy Drives
• Parallel Printer Ports
• Full Size Keyboards
• Modems, Int. & External
• Joysticks, Serial Cables
• PCjr Network cards
• BASIC Cartridges, Mice
• PCjr Tested Shareware
• Complete Computers
• Repair Service
Send for Catalog Today
COMPUTER RESET
Attn: Dept. FCH
P.O. Box 461782, Garland Texas 75046
(214) 276-8072
CIRCLE 89 ON READER SERVICE CARD

ALL BOOKS --- 18% OFF --- PLUS

Order by modern or voice
Julian Gillett, JACKSON PUBLISHING, 15,000 titles
Computers Business Fiction Non-fiction
All discounted!
PLUS EVEN DEEPER DISCOUNTS ON PC hardware, software, supplies including Design-Your-Own computers And Lease-to-Own. Call now...
DISCOUNT STORES
Modern (800) 866-5080 Voice: (800) 873-0720

PC Magazine Marketplace
2nd Color Option Available

COMPUTER INSURANCE

DATA SECURITY INSURANCE

The ONLY "ALL-RISK" Policy
Call today for immediate coverage.
1-800-822-0901
CIRCLE 90 ON READER SERVICE CARD

INSURES YOUR COMPUTERS

Full replacement of hardware, media, purchased software. As low as \$39 yearly. Covers fire, theft, power surges, other accidents. Blanket coverage; no list of equipment needed. Call for information or immediate coverage.
1-800-848-3469
Local (614) 262-0559
SAFEWARE, The Insurance Agency Inc.
2929 N. High Street, P.O. Box 02211
Columbus OH 43202
CIRCLE 91 ON READER SERVICE CARD

DATA CONVERSION

DATA CONVERSION

DISK → DISK → TAPE → DISK
OPTICAL SCANNING

WORD PROCESSORS
SPREADSHEETS
DATA BASES, MAIL LISTS
OVER 2,500 FORMATS

IBM PS2 WORDPERFECT LOTUS DBASE LANNER WANG

(212) 463-7511
NATIONAL DATA CONVERSION INSTITUTE
14 EAST 11th STREET, NEW YORK, NY 10003
AMERICA'S LEADERS IN DATA CONVERSION
CIRCLE 92 ON READER SERVICE CARD

DATA CONVERSION

9-TRACK TAPE

CHECK OUR FEATURES CHECK OUR PRICES

We Support IBM PC/XT/AT, PS2, Mac and Sun
• Unix, Xenix, DOS Drivers
• 800/1600/3200/6250 BPI
• Tape Duplication
• Linkable Modules
• Easy and Fast Conversion
• Disk Backup/Restore
• Unlimited Block Size
• 256 K or 1 M Ram on Board

Best Prices - Call Today 415-324-9114

MicroTech Conversion Systems
525 Alma Street, Palo Alto, CA 94301
Quality Conversion Products Since 1980
CIRCLE 93 ON READER SERVICE CARD

OPTICAL SCANNING

DATA CONVERSION LABORATORY
America's Largest Data Conversion and Optical Scanning Facility
8410 Harwin Road, East, Fresh Meadows, NY 11365
(718) 357-8700
CIRCLE 94 ON READER SERVICE CARD

BUSINESS PROJECT MGMT.

PROJECT SCHEDULING IN 1-2-3 AND SYMPHONY

PROJECT CALC "locks in" new menu choices to create projects on your spreadsheet. Link project costs & dates with budgets. Ask "what-if" with time! Create Gantt charts of dates, slack time, milestones, and PERT charts or network diagrams of tasks. Print charts through PrintGraph with colors, lines and legends. Format and print formal reports of dates and costs with /Print PROJECT CALC performs critical path analysis. Find the earliest/latest start and finish dates for each task. Specify work hours, vacations, and holidays on a graphic calendar. Works with CDA, EDA, VBA, Hercules. \$179.95. FRONTLINE SYSTEMS, INC. (Box 7420-F.C., San Francisco, CA 94120) (800) 481-0203 v.05. (415) 877-7171 v.05
CIRCLE 95 ON READER SERVICE CARD

MARKETPLACE

DATA RECOVERY SERVICES

ONTRACK 800-752-1333
DATA RECOVERY INC.

In MN Call 612-937-1107

The Only Custom Data Recovery Experts

A service from the
creators of Disk Manager!
Recommended by major
drive manufacturers.

Call us when:
• Your hard disk can't be booted
• You can't access a file
• Your directories and/or FATs
are scrambled or gone, etc.

For that critical moment when only the best will do.

CIRCLE 828 ON READER SERVICE CARD

DISK CONVERSION

TAPE/DISK CONVERSIONS



Conversion services to or from over
1250 computer systems:
• Magtapes • Mini Computers
• Micro Computers • Typesetters
• Word Processors

CALL THE INDUSTRY LEADERS

**PIVAR
COMPUTER SERVICES, Inc.**

(312) 459-6010
165 Arlington Heights Rd #M
Buffalo Grove, IL 60089
CIRCLE 837 ON READER SERVICE CARD

TAPE-TO-FLOPPY
FLOPPY-TO-TAPE
TAPE DUPLICATION
FLOPPY-TO-MICROFICHE
LASER PRINTING

1-800-422-9622
(In OK: 918-254-9622)



**TECHNICAL PROGRAMMING
SERVICES, INC.**
1504 W. 41st Street
Tulsa, OK 74101-1901

CIRCLE 838 ON READER SERVICE CARD



EDITOR'S
CHOICE

FACT FILE

Get The Word Out! Your Product Has Been Chosen EDITOR'S CHOICE.

Let us take your article to its highest
level of marketing potential with a reprint!

To find out how you can have your article or review
elegantly reprinted ** on 80 lb. paper stock, in 4-color,
2-color or 1-color, call or write today:

Jennifer Locke—Reprints Manager;
Ziff-Davis Publishing Company,
One Park Avenue, New York, NY 10016, 212-503-5447.

** Minimum quantity 500 reprints.

THE SHOWCASE
FOR PRODUCTS
AND SERVICES IN
THE MS DOS
MARKET . . .

TO PLACE YOUR
AD IN
PC Magazine
Marketplace
Call (212) 503-5115
or (800) 825-4ADS

DISK/TAPE/OPTICAL SCANNING

- 33¢ per page typewritten text to disk in ASCII, 50¢ per page all WP formats
- Scan typeset text 6 to 24¢ per line rates
- Disk conversion from IBM, Wang, Xerox, NYDEC + 1000 others customized
- Tape conversions 1800, 1600, 3200, (250 BPI)
- BEST RATES • FILE TEST

for RUN COMPUTER SERVICES
1261 Broadway Suite 508
New York, NY 10001
(212) 779-0800

TOTAL SERVICE CONVERSIONS

- OUR NAME SAYS IT ALL •
- Quality Service •
- Quick Turnaround •
- Low Prices •
- 1-800-5-CDNVRT •
- In CA 1-213-469-8134 •
- Formerly W. Test Sciences Corporation •

TOTAL SERVICE CONVERSIONS, INC.
1933 North Monon Street
Los Angeles, CA 90027

DISKETTE COPY SERVICE

There is no substitute for experience!

For software duplication backed by five years of
experience, call the experts at Echo Data! Here's why we
continue to be one of the nation's leading duplicators:

- Round-the-clock production facilities.
- Tough, 4 step quality control process.
- 100% satisfaction guarantee policy.

WE'RE THE EXPERTS IN 3.5" DUPLICATION.



Echo Data Services, Inc.
Lionville, PA 19353
800-533-4188
215-363-2400 in PA
CIRCLE 839 ON READER SERVICE CARD

CHANGING WORD PROCESSORS?

Media transfer to or from:
IBM, XEROX, DEC, WANG,
LAMAR, CPT, CT, MICROM, NBI,
WORDSTAR, WORDPERFECT, MSWORD, DWG,
MULTIMATE, SAMNA, NASI, OCA
*****FREE TEST CONVERSION*****
Conversion Specialists
531 Main St., Suite 835
El Segundo, CA 90245
(213) 545-6551 • (213) 322-6319

DISKETTE COPY SERVICE

DUPLICATION FROM 5¼"

Afterloadable rates only \$16 for 5.25" & \$1.59 for
3.5" MS-DOS Duplication. Price includes:
*Quality Brown Disc Media
*Duplication with 100% verification
*Label Application
*Quick Turnaround & Guaranteed Products
Rates go even lower as you continue to order!
DIVERSIFIED SYSTEMS GROUP, INC.
P.O. Box 1114
Issaquah, WA 98027
800/255-3142 206/392-0900

MARKETPLACE

DISKETTE COPY SERVICE

New Datapath Diskette Duplication Systems

To get exactly the diskette duplicating capacity you need today, start with any IBM PC XT or AT or compatible. Then install our Model all Diskette Duplication — at \$8995. It uses only one slot in your PC, and produces up to 240 copies per hour (or for high-speed, unattended operation, add our new \$799 or \$1999 Desktop Autoloader —



at just \$2495. Datapath systems are expandable up to 8 drives. They run 3½" and 5¼" drives simultaneously, and feature multiple formats — including PS/2. They're multi-tasking systems so you can run up to 8 different jobs at once. For more information, or to order, call today, 415 651-5380.

Datapath

© 1988 Datapath Technologies, Inc. 46780 Fremont Boulevard, Fremont, CA 94538, 415-651-5380

CIRCLE 80 ON READER SERVICE CARD

AUTOMATIC DISKETTE COPIER

As Low As **\$2,665⁰⁰**

- Up to 180 copies per hour
- 5% " or 3%"

800-222-0490

In NJ 201-462-7628
FAX 201-462-5658

MEGAsoft

P.O. Box 710, Freehold, NJ 07728
Full Service Duplication Facility

CIRCLE 81 ON READER SERVICE CARD

SOFTWARE PRODUCTION

- Disk duplication
- All formats
- EVERLOCK copy protection
- Label/sleeve printing
- Full packaging services
- Warehousing
- Drop shipping
- Fulfillment
- 48 hour delivery
- Consultation & guidance

Star-Byte, Inc.

2800 Burgundy Rd. Highland Park, IL 60034
800-243-5115 215-977-2470

CIRCLE 82 ON READER SERVICE CARD

NETWORKING

KEYCARD ELIMINATOR

KEYCARD ELIMINATOR 400, 800, 1200, 24, 48, 96 1155 & 2400 \$99	3 C R. ELIMINATOR 2400, 36, 48, 96 1155 & 2400 \$99
TELE UTILITIES RPM & P-100 1155 & 2400 \$59	NEC/IBM 1000 & 1200 1155 & 2400 \$99
GET/BIOS DRIVERS 2400 & 1155 \$59	BIOS TOOLS 2400 & 1155 \$99

(713) 781-9268

NBS
NETWORK BUSINESS SYSTEMS
10000 E. 112th Street, Suite 100
Minneapolis, MN 55426
MINI-ITEL AUTHORIZED RESSELLER

CIRCLE 83 ON READER SERVICE CARD

SUPPLIES

SELL US YOUR EMPTY TONER CARTRIDGES \$10

We buy empty HP, Canon, Ricoh, Xerox, and other toner cartridges. Cash payment. No hassle. No return. Quality tested and sold. We buy all toner cartridges. Call today. 1-800-243-5115. Fax 215-977-2470. Star-Byte, Inc.

BUY OUR REBUILT CARTRIDGES

We have HP, Canon, Ricoh, Xerox, and other toner cartridges. Cash payment. No hassle. No return. Quality tested and sold. We buy all toner cartridges. Call today. 1-800-243-5115. Fax 215-977-2470. Star-Byte, Inc.

CIRCLE 84 ON READER SERVICE CARD

SUPPLIES

TONER CARTRIDGE RECONDITIONING

Laser Printers • Canon PC Copiers • Facsimile • Mirohm Copiers

LASER PRINTERS \$39.95 / PC COPIERS \$39.95

Call Toll Free 1-800-541-4548
or 1-800-543-4529 (In Mississippi)
FREE DELIVERY

LASERCRAFTERS
TONER CARTRIDGE
RECONDITIONING

6016 Slater Circle
Pasadena, MS 39667
(801) 475-4881

SPECIAL: When sending checks include your purchase Ad and receive a \$5 discount OFFER! Exp. 3/12/89

CIRCLE 85 ON READER SERVICE CARD

TONER CARTRIDGES

Remanufacturing \$44.50. PC \$34.50. Canon \$64.50. 100% satisfaction. New cartridges from \$89.50. Series II. Bulk. 24 hours in & out.

LASER
Quick

Dealerships
*Toll Free

2 DAY AIR
Return Delivery

\$44.50 for laser cartridges

800-777-8444

CIRCLE 86 ON READER SERVICE CARD

RIBBONS

1-800-331-6841
1-513-252-1247 (Ohio)

Over 350 types

Volume Discounts Available

• Satisfaction Guaranteed •

	BLACK	COLORS
APPLE IMAGEWRITER	2.60	3.60
APPLE II COLOR	—	8.95
QUADAL HT II M/S	2.25	—
EPSON LX-80/90	2.25	3.50
EPSON MM-FX 80	2.50	3.50
EPSON MM-FX 100	3.50	4.50
IBM PROPRINTER	3.50	—
NEC P1, 2, 6	4.95	—
NEC P3, 7	4.65	—
OKIDATA 82-82	1.15	1.50
OKIDATA 182-182	3.50	4.50
PANASONIC 4037	3.50	4.50

DAYTON COMPUTER SUPPLY

a division of Day-Tek Corp.
1220 Wayne Avenue, Dayton, Ohio 45410
EST. 1979 TERMS: M/C, VISA, C.O.D.
DISCOVER

CIRCLE 87 ON READER SERVICE CARD

TRAINING/TUTORIALS

LEARN PROGRAMMING

Anyone can learn interactive diskettes: over 1000 programs loaded w/Samples and Source. * CLIP-TRIM for CLIPPER (Nantux) * FOX-TRIM for FoxBASE + (Fox Software) * DEG-TRIM for dBASEIII + (Ashton-Tate) Learn by doing: draw Boxes, Menus, create Files, Indexes, Sort and Edit data. More advanced diskettes to follow introductory price \$79 each + \$5 + \$5 (list \$99). Or DEMO only \$10 + adjustable incl. s&h. Rush Check/MO. BAC SYSTEMS, INC. 32-19 28th Street, Dept. PCM Bayshore, NY 11351 (718) 428-0174

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume, discounts, specifications and delivery.

If you think that your business can benefit from the 700,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115 or (800) 825-4405

EDITORIAL PRODUCT INDEX

READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE
ADD-IN BOARDS				407	Panasonic FX-BM88 + Fax Partner	Panasonic Corp.	130	SOFTWARE			
417	ConoDesk 8000	Conographic Corp.	207	396	SMARTFAXplus	American Data Technology Inc.	98	445	CrossView	DataEase International Inc.	52
419	EiconScript Card	Eicon Technology Corp.	209	GRAPHICS (HARDWARE AND SOFTWARE)				426	Freedom of Press	Custom Applications Inc.	218
421	JetScript	QMS Inc.	219	443	Corel Draw! Version 1.0	Corel Systems Corp.	56	427	GoScript Omniview, Version 4.11	LaserGo Inc.	218
428	JLaser Plus AT4	Tall Tree Systems	226	HARDWARE				441	PC Tools Deluxe, Version 5	Sunny Hill Software	46
429	LaserMaster LC2	LaserMaster Corp.	226	454	Core HC-380 Core CNT-MCA	Core International	43	455	Personnel Policy Expert, Version 1.0	Central Point Software	48
418	CAPCard Controller PageStyler	Destiny Technology Corp.	207	447	LazGRAM	FX Unlimited	51	456	Puzzle Plus	Application Techniques Inc.	46
422	PC Publisher Kit Series II	QMS Inc.	224	450	Lundy 1612	Lundy Electronics and Systems Inc.	51	446	Send-Off! Sidekick for Presentation Manager	Intel Corp.	52
420	PS-388 Accelerator	Princeton Publishing Labs Inc.	214	444	SilentPartner	Presentation Electronics Inc.	51	457	Step Forward SuperCalc 5	Borland International Inc.	33
AFTER HOURS				OPERATING SYSTEMS				451	Ashton-Tate Computer Associates International Inc.	51	
413	Andrew Tobias's Checkwrite Plus	MECA Ventures Inc.	402	424	Merge 386	Locus Computing Corp.	162	456	Spreadsheet Analysis Training	Osborne/McGraw-Hill	54
412	Andrew Tobias's Managing Your Money, Version 5	MECA Ventures Inc.	404	425	VPix	Interactive Systems Corp.	168	432	OS/2 Programming: An Introduction	Osborne/McGraw-Hill	54
415	Bubble Ghost	Accolade Inc.	400	PRINTERS				UTILITIES			
411	QuotChart	Quotron Systems Inc.	406	448	NEC Silentwriter LC 890XL	NEC Information Systems Inc.	51	433	Vtune	Emulation Technologies Inc.	54
411	QuotData	Quotron Systems Inc.	406	PRODUCTIVITY							
411	Quotron Open Windows	Quotron Systems Inc.	406								
418	QuotTerm	Quotron Systems Inc.	406								
416	Star Saga: One	Masterplay Publishing Corp.	400								
414	Wealth Insurance	Britannica Software	402								
COMPUTERS											
442	CompuAdd 286-20	CompuAdd Corp.	38								
449	Dolch P.A.C. 386-25	Dolch Computer Systems	52								
DATABASE MANAGEMENT											
440	Data Junction 2.1	Tools & Techniques Inc.	36								
FAX BOARDS											
397	AT&T Fax Connection	AT&T	101								
399	Brother IntelliFAX	Brother International Corp.	108								
400	The Complete Fax/9600	The Complete PC	112								
403	Connection CoProcessor	Intel PCED	120								
401	Facsimile Pack	DEST Corp.	114								
398	FaxMail 96	Brook Trout Technology Inc.	105								
402	GammaFax	Gammalink	116								
409	ImageCard	Rich Corp.	134								
406	JT-Fax 9600	Quadram Limited Partnership	132								
410	MicroFax	Xerox Imaging Systems/Datacopy	140								
404	MicroLink Fax LC96	MicroLink International Inc.	122								
405	Omnivox PC Fax System	Omnivox Corp.	124								
406	Pamirs FA10	Pamirs Business International Corp.	128								

FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1 Fill in your name and address and check off your answers to the eight research questions. (One card per person, please.)

2 Circle the numbers on the card that correspond to the ads or articles you'd like more information about. (Numbers for advertised products are repeated in the Advertiser Index as well.)

3 The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Valid after July 15, 1989

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

1. In which of the following

sectors does your organization operate? (Check one.)

- a. ☐ Private Industry
- b. ☐ Government
- c. ☐ Education

2. Your primary job function is (check one.)

- d. ☐ MIS/Df, Communications Systems, Programming
- e. ☐ Engineering/R&D
- f. ☐ Financial/Accounting
- g. ☐ Marketing/Sales
- h. ☐ Administrative/General Management

3. Is your company a reseller?

- i. ☐ Yes
- j. ☐ No

4. For how many IBM PCs and compatibles do you specify brands of products?

- k. ☐ 10 or less
- l. ☐ 11-25
- m. ☐ 26-100
- n. ☐ 100 or more

5. Are there any PCs in your office? (Check all that apply.)

- a. ☐ Linked to mainframe
- p. ☐ Linked to mini
- q. ☐ Networked together

6. Does your company own

- r. ☐ Mainframe(s)
- s. ☐ Mini(s)

7. Do you plan to buy any PC products?

- t. ☐ Now
- u. ☐ In 4 to 6 months
- v. ☐ In 6 to 12 months
- w. ☐ No definite plans

8. Number of employees in your entire company?

- x. ☐ 25 or less
- y. ☐ 26-99
- z. ☐ 100-499
- 1. ☐ 500-999
- 2. ☐ 1000 or more

PLEASE PRINT CLEARLY—use only one card per person

PC 411-4

Name _____

Business Phone (_____) _____

Company _____

Address _____ Apt. _____

City _____

State _____ Zip _____

(Zip code must be included to insure delivery)

☐ Please send me one year (22 issues) of PC Magazine for \$29.97. I'll save 54% off the annual newsstand price of \$64.90. (Annual basic subscription price is \$44.97.) Offer valid in U.S. and possessions only.

CIRCLE FOR FREE INFORMATION

Valid after July 15, 1989

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

1. In which of the following

sectors does your organization operate? (Check one.)

- a. ☐ Private Industry
- b. ☐ Government
- c. ☐ Education

2. Your primary job function is (check one.)

- d. ☐ MIS/Df, Communications Systems, Programming
- e. ☐ Engineering/R&D
- f. ☐ Financial/Accounting
- g. ☐ Marketing/Sales
- h. ☐ Administrative/General Management

3. Is your company a reseller?

- i. ☐ Yes
- j. ☐ No

4. For how many IBM PCs and compatibles do you specify brands of products?

- k. ☐ 10 or less
- l. ☐ 11-25
- m. ☐ 26-100
- n. ☐ 100 or more

5. Are there any PCs in your office? (Check all that apply.)

- a. ☐ Linked to mainframe
- p. ☐ Linked to mini
- q. ☐ Networked together

6. Does your company own

- r. ☐ Mainframe(s)
- s. ☐ Mini(s)

7. Do you plan to buy any PC products?

- t. ☐ Now
- u. ☐ In 4 to 6 months
- v. ☐ In 6 to 12 months
- w. ☐ No definite plans

8. Number of employees in your entire company?

- x. ☐ 25 or less
- y. ☐ 26-99
- z. ☐ 100-499
- 1. ☐ 500-999
- 2. ☐ 1000 or more

PLEASE PRINT CLEARLY—use only one card per person

PC 411-5

Name _____

Business Phone (_____) _____

Company _____

Address _____ Apt. _____

City _____

State _____ Zip _____

(Zip code must be included to insure delivery)

☐ Please send me one year (22 issues) of PC Magazine for \$29.97. I'll save 54% off the annual newsstand price of \$64.90. (Annual basic subscription price is \$44.97.) Offer valid in U.S. and possessions only.

HOW TO STAY ON TOP OF WHAT'S IN THE PC MARKET

USE THIS CARD TO OBTAIN FREE INFORMATION ABOUT PRODUCTS AND SERVICES IN THIS ISSUE

(SEE OTHER SIDE)



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 40049
Philadelphia, PA 19106-9871



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 40049
Philadelphia, PA 19106-9871



COMING UP

DATA TRANSFER SPECIAL Find your way through the complicated world of data transfer and media conversion using a special multipart cover story as your guide.

■ **The 3½-inch Conversion** Getting your data from AT-class machines equipped with 5¼-inch drives to laptops or PS/2s equipped with 3½-inch drives is a bothersome chore. It can be made easy either by installing a 3½-inch drive in your AT or by using file transfer software and cable to send the information across. PC Labs investigates the options and takes you through the installation process.

■ **Format Conversion Software** It's a simple task to move your text files from one word processor to another, but it isn't so easy to reenter all your tab settings, underlining, and margins after they've been lost in the shuffle. Solve the problem with format conversion software that guarantees a smooth translation for your text files.

■ **From PC to Mac** Because the Macintosh and PC environments both offer a wealth of indispensable programs, communication between the two is essential. Read a detailed overview of the dozens of products that have been designed to facilitate this integration.

■ **From PC to Mainframe** Why not discover the new ease of half-inch nine-track magnetic tape as a means of transporting data between PCs and mainframes? It's an idea whose time has come. . . again.

VIRUSES The virus threat is real, but you can protect yourself with one of several affordable antivirus programs, ranging in price from \$10 to \$189. *PC Magazine* reviews 11 protection packages, gives you the facts on the virus syndrome, and explains how simple common sense may be the best protection you'll ever have.

DISKLESS LANSTATIONS By adding diskless LANstations to your network, you gain smaller footprints, quieter operation, and security. Frank J. Derfler, Jr., evaluates models from ALR, Corman Technologies, Dell, Earth Computer Technologies, NCR, Network Innovations, Racore, 3Com, and Unisys. [E]



PC MAGAZINE ADVERTISING SALES STAFF
One Park Avenue, New York, N.Y. 10016
(212) 503-5100

National Advertising Director - Richard Marino
Director of Sales - Telemarketing - Nancy Newman
Telemarketing Supervisor - MaryJo Boudinot

Senior Advertising Coordinator - Jane L. Gottlieb
Advertising Coordinator - Allison Dubin

Al Di Guido - Eastern Advertising Manager
(212) 503-5310

MA, NH, VT, ME, RI, CT
Sloan Seymour - District Manager
(617) 497-2632
Vickie Pinsky - District Sales Representative
4 Cambridge Center
Kendall Square
Cambridge, MA 02141
(617) 497-2633
Scott Budd - Account Representative
(212) 503-5132

NY, NJ, PA
Joseph Gillespie - District Manager
(212) 503-5294
Mary Anotto - District Sales Representative
(212) 503-5149
One Park Avenue
New York, NY 10016
Jeannie Buchner - Account Representative
(212) 503-5333
John McGuinness - Account Representative
(212) 503-5227

DE, MD, DC, VA, WV, NC, SC, AL, MS, TN, AR, KY, GA, FL
Scott J. Seltz - District Manager
Mark Crafts - District Sales Representative
3406 Piedmont Road
Atlanta, GA 30305
(404) 239-9780
Karen Halloran - Account Representative
(212) 503-5130

David Fales - Central Advertising Manager
(212) 503-5114

NE, WI, IL, IN, MN, MO, OH, MI, IA, ND, SD, Canada
Pete Foster - District Manager
180 N. Michigan Avenue Suite 1400
Chicago, IL 60601
(312) 346-7666
Jay Overby - Account Representative
(212) 503-5126
Doug Dauray - Account Representative
(212) 503-5047

TX, OK, LA, KS, UT, NM, CO
Stephen Shore - District Manager
Sandy Schackman - District Sales Representative
5956 Sherry Lane Suite 1330
Dallas, TX 75225
(214) 691-8934
Helen Morris - Senior Account Representative
(212) 503-5104

Jonathan Lane - Western Advertising Manager
(415) 378-5525

CA (San Francisco & North), ID, OR, WA
Mike Kisseberth - District Manager
(415) 378-5527
Debra Silver-District Sales Representative
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520
Lee Umacke - Account Representative
(212) 503-5129

CA (Santa Barbara to So. San Francisco), WY, MT, AK
Gini Taimadge - District Manager
(415) 378-5521
Steve Moorman - District Sales Representative
Kathryn Mandahl - District Sales Representative
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5528
Richard Vandervoorn - Account Representative
(212) 503-5041

CA (LA, San Diego & Orange County), AZ, NV, HI
Debra Hulsken - District Manager
Robin Kofsky - District Sales Representative
David Lynn - District Sales Representative
Paul Klein - District Sales Representative
18500 Von Karmen Ave. Suite 510
Irvine, CA 92715
(714) 852-8001
Beth Gartenberg - Account Representative
(212) 503-5040
Christina Lynch - Account Representative
(212) 503-5113

AFTER HOURS



In this room, Bubble Ghost has to show means of talent in order to clear a path for the bubble.



GAMES

Bubble Ghost: A Haunting Game of Skill And Finesse

BY ILONA PRICE

If you think computer animation games can be challenging, amusing, and engrossing, Accolade won't burst your bubble. In fact, if you break all of the bubbles in Accolade's *Bubble Ghost*, you lose.

This \$34.95 game of finesse and perspective, for one or two players, is set in the late inventor Heinrich Von Schtinker's 35-room haunted castle. The object of the game is to manipulate Heinrich's spirit (a.k.a. Bubble Ghost) so that the ghost blows a bubble through the 35 rooms of the castle, past all of Von Schtinker's mad inventions, most of which are fatal to bubbles. The graphics are exceptional, and each room of the castle is full of imaginative detail and brilliant colors.

Like all bubbles, the one in this game is delicate. If it hits one of the many obstacles, it bursts and you lose one of your six allotted bubbles. The bubble goes nowhere until you figure out how to get by these objects. Solving one of these puzzles earns you 5,000 points. The an-

swer is usually simple, but not always obvious. In one room, a fan blows the bubble back toward the hapless ghost, no matter how hard he puffs. The solution is to shut off the fan, but how? Questions like this are the heart of the game, and set *Bubble Ghost* apart from other arcade-style games.

Each time you complete a level your ghost earns an extra bubble. Once you pass through all of the rooms in the castle, the ghost is set free and the castle is no longer haunted.

The Bubble Ghost himself is indestructible. He can touch or bump into any obstacle without injury. If you make the poor spirit blow too hard, however, he turns red and you lose 1,000 points.

Bubble Ghost requires skill, patience, and careful planning. A practice mode lets you practice any level of the game, which is useful when a particular level is giving you difficulty. It is not difficult to grasp the object of the game, but you must put thought into your escape from the castle and be very careful not to "blow it" by bursting all of the bubbles.

List Price: *Bubble Ghost*, \$34.95. Requires: 256K RAM, DOS 2.1 or later, CGA graphics. Not copy protected. Accolade Inc., 550 S. Winchester Blvd., #200, San Jose, CA 95128; (408) 296-8400.

CIRCLE 415 ON READER SERVICE CARD



GAMES

PC Meets Game Board As *Star Saga: One* Mixes Old and New

BY DONALD B. TRIVETTE

During a space plague in the year 2490, the Earth and eight nearby planets banded together in a confederation named Nine Worlds. To keep alien diseases from ever again devastating its inhabitants, the confederation built an impenetrable wall called "The Boundary" to separate Nine Worlds from the rest of the cosmos.

That's the opening premise of *Star Saga: One*, a multimedia game for one to six players that involves not only your PC but also a game board and tokens. You and your fellow gamers select your characters from a cast that includes Laran Darkwatch, a mystic; M. J. Turner, a hotshot pilot; and Lee Dambroke, a university xenobiologist.

Star Saga is not a conventional computer game with colorful maps, snazzy sound, and wild animation. Nor is it the usual *Adventure*-like text game. Instead, *Star Saga* is a hybrid role-playing board game that uses the computer to direct the

play as a human moderator might. At each turn, you go to the computer and tell it who you are, and then you tell it how you played your turn. The Computer Game Master—a.k.a. the Chubby Grey Monitor—tells you the results of your move and directs you to read passages from the *Star Saga* text.

Reading is what this game is really about, and the *Star Saga* text covers hundreds of pages. Although you need read only those passages that apply to your character, even that can involve a considerable amount of text. You must also read the 12-page booklet that introduces the game, sets the rules, and describes your character. As the game progresses, players compete against one another for position, resources, and knowledge, but in the end everyone must cooperate to banish a common foe.

Star Saga: One is not something you pick up to kill a few hours before a movie. Indeed, the manual advises that just one game may take 60 hours. Fortunately, it doesn't have to be completed in a single sitting.

List Price: *Star Saga: One*, \$79.95. Requires: 256K RAM, DOS 2.0 or later. Not copy protected. Masterplay Publishing Corp., 8417 Sun State St., Tampa, FL 33634; (813) 888-7773.

CIRCLE 416 ON READER SERVICE CARD



Up to six people may play *Star Saga: One*, each choosing a unique role.

ADVERTISERS PRODUCT INDEX

REF#	ADVERTISER	PRODUCT	PAGE#
------	------------	---------	-------

ACCOUNTING SOFTWARE

482	Bedford Software Limited	Accounting Software	49
102	Computer Associates	ACF: PAC	12-13
194	Seeger-MIT Software	ACT 2	250
263	Macola Inc.	Dac Easy Accounting	74-75
301	PC Exchange	Accounting Software	106-107
358	Proactive Software	Accounting Software	309
470	SRT Corp.	Double Bonus Bundle	258
227	Sourcemark Information Systems	Database Accounting Library	113
		Accountmark Plus IV	335

DATABASE MANAGERS

377	Borland International	Paradox 3.0	57
494	Bullman	PC File DB	168
134	Clarion Software	Professional Developer	70
113	Concentric Data Systems	R & R Relational Report Writer	165
244	Information Builders	PC/Focus	232
*	Oracle	Database Management Software	42
529	Public (Software) Library	Database Management Software	47
		Shareware Software	162

FILE SYSTEMS & ACCESS METHODS

*	Dac Software	Shareware	74-75
529	Public (Software) Library	Shareware Software	162

FINANCIAL PLANNING SOFTWARE

315	Concentric Data Systems	Trend Setter Expert	163
	Intuit Software	Quicken	29

INFORMATION MANAGERS

113	Concentric Data Systems	R & R Relational Report Writer	165
-----	-------------------------	--------------------------------	-----

LANGUAGES

137	Borland International	Turbo Pascal	55
380	Hammer Computer Services	Pro Bas	326
380	Hammer Computer Services	Pro Bas Tool Kit	326
290	LaserGo Inc.	Go Script	21
	Microsoft	Quick Basic 4.5	324
331	Microway	Fortran Compiler	330

OPERATING SYSTEMS ENVIRONMENTS

349	DSC Communications	OS/2 Needs	135
192	Quantum Software Systems, Inc.	DXC	153

PROGRAM DEVELOPERS/GENERATORS

380	Hammer Computer Services	Pro Bas	326
380	Hammer Computer Services	Pro Screen	326
529	Public (Software) Library	Shareware Software	162

PROJECT MANAGEMENT

134	Clarion Software	Professional Developer	70
249	Navette Software	Project Management Software	170
201	Symantec	Timeline	63

STATISTICAL SOFTWARE

315	Concentric Data Systems	Trend Setter Expert	163
101	SPSS, Inc.	SPSS/PC Data Analysis Software	323

TEXT EDITORS

188	Command Technology Corp.	SPH-PC	152
369	Golden Bow Systems	VO	4

UTILITIES

234	3X USA	3X-Link 16	99
120	Central Point Software	PC Tools Deluxe 5.0	82
113	Concentric Data Systems	R & R Relational Report Writer	165
256	Delta Technology	Direct Net/Direct Access	66-68
323	Funk Software	Sideways, Networkcity, Inwards	66-68
380	Hammer Computer Services	Pro Bas	326
380	Hammer Computer Services	Pro Screen	326
167	Helix Software	Headroom	34
280	LaserGo Inc.	Go Script	21
170	Multisoft Corporation	PC KWIK	314
302	Peter Norton Computing	Utility	250-251
290	Rose Electronics	Master Link	228
334	Saflogic Solutions	Disk Optimizer	39

WORD PROCESSING SOFTWARE/AIDS

200	AGFA CompuGraphics	Type Director	208
200	AGFA CompuGraphics	Type Director	209
113	Concentric Data Systems	R & R Relational Report Writer	165
280	LaserGo Inc.	Go Script	21
155	Meta Image Base, Inc.	Clip Art	318
480	MicroPro International	WordStar 5	342-343
248	Timeline	Timeline	128
318	Zytek Corporation	ZV Index	18

SPREADSHEET/TEMPLATES

*	Dac Software	Lucid 3.0	67
*	Dac Software	Lucid 3.0	74-75
237	Funk Software	Always	131
253	Funk Software	Sideways, Networkcity, Inwards	66-68
*	Microsoft	Excel	2-3
282	Personics Corp.	Look and Link	17

PAYROLL PERSONEL

*	Dac Software	Dac Easy Payroll	74-75
---	--------------	------------------	-------

REF#	ADVERTISER	PRODUCT	PAGE#
------	------------	---------	-------

DESK TOP PUBLISHING

200	AGFA CompuGraphics	Type Director	208
200	AGFA CompuGraphics	Type Director	209
290	LaserGo Inc.	Go Script	21
299	Swiss International, Ltd.	Glyphs	37
744	Z-Soft	Publisher's Paintbrush	225

DATA ENTRY SOFTWARE

174	Formworks Corp.	Formworks	169
-----	-----------------	-----------	-----

ENTERTAINMENT SOFTWARE

203	Wesson International	Tracon	322
-----	----------------------	--------	-----

HOME MANAGEMENT SOFTWARE

*	Dac Software	Dac Easy Light	74-75
---	--------------	----------------	-------

FORM DESIGNERS

140	Bac Development	Form Designers	66
385	Deerfield Systems, Inc.	Display Forms II	315
174	Formworks Corp.	Formworks	169

COMPATIBLE KEYBOARDS

515	Wells American	Compu Star	14
513	Wells American	Compu Star	50
723	Zen International	Keyboards	332

BACKUP SOFTWARE

485	Westlake Data Corp.	PC Backup	317
-----	---------------------	-----------	-----

DISK BACKUP & TAPE DRIVES

120	Central Point Software	PC Tools Deluxe 5.0	82
370	Corel Systems	Optical Disk Drive	123
286	Fifth Generation	Fastback Plus	186
153	Kern Products	Hard Disk Drive	179
380	Swan Technologies/TCF	Tape Backup	22-23
384	Tecmar Inc.	Tape Back-Up	248

HARD DISKS

217	Qual Group	Peripherals	336
281	Hard Drive International	Plus Passport	272-273
*	Seagate	Hard Disk Drives	245

COMPUTERS COMPATIBLES

483	Advanced Logic Research	Computer Systems	30-31
270	Altec Technology Corp.	PC Compatibles	171
179	Amec Engineering	Amec Computers	267
335	American Mitac	Panasonic 286 VE	111
166	AST Research	Computer System	145-147
509	Austin Computers	Compatibles	10-11
481	Aut Day Computer Products	Computer/Compatibles	60-61
252	Clone Computers	Compatibles	360
	Computer Discount Warehouse	Mail Order	385
163	Computer Products United	PC Compatibles	310-311
483	Danmark International	Compatibles	366
	Dataview	PC's	133
536	Dell Computer Corporation	DeL Computers	C3-04
536	Dell Computer Corporation	Dell Computers	C3-08
379	Dyna Computers	386 HZ 386	178
216	Environ Systems, Inc.	Step Computers	80-81
319	Everest Electronics, Inc.	Compatibles	302
213	Gateway 2000	PC's	93
358	Hyundai	Computers/Compatibles	148
	IBM	Computers/Compatibles	24-25
*	Norridge Computer Systems	Compatibles	254
*	Norridge Computer Systems	Compatibles, 286/12	287
*	Norridge Computer Systems	Elegance	282-283
*	Norridge Computer Systems	Compatibles, 286/12	288-289
*	Norridge Computer Systems	2 Choices	295-297
303-308	PC Brand	Compatibles	180-181
308-304	PC Brand	Compatibles	182-183
314	310-311	Compatibles	184-185
372	PC Design	Compatibles	256
353-535	PC Network, The New	Computers/Compatibles	351-353
	Sun Microsystems	386i	159
368	Sun Microsystems	386	160-161
370	Swan Technologies/TCF	Compatibles	22-23
*	Tandy Corporation	Compatibles	338
264	Tandy Corporation	Compatibles	339
	Vindex	Computers	21
513	Vindex	Computers	21-3
515	Wells American	Compu Star	14
513	Wells American	Compu Star	50
721	Zen International	Keyboards	229-231

INPUT DEVICES

742	Diamond Power Electric Instru	Hand Scanner	127
217	Dual Group	Peripherals	338
182	Logitech	Hi Resolution Mouse	238-239
*	Microsoft	Mouse	262
333	Microsoft Int. Corp.	Mouse	256
	Norridge Computer Systems	Keyboards	329

PROGRAMMERS TOOLS UTILITIES

118	Beau Computing	Programming Tools	306
369	Golden Bow Systems	VQ	4

AFTER HOURS

PERSONAL FINANCE

Andrew Tobias' *Checkwrite Plus: A Detailed Approach to Bill Paying*

BY GUS VENDITTO

Is a PC a good tool for managing your checkbook? Only if it makes the work go faster. That means getting the checks out the door more easily and spending less time sweating over a complicated balance sheet.

Andrew Tobias and the other folks who brought you *Andrew Tobias' Managing Your Money* have decided to take a crack at this seemingly simple job. They know a lot about personal finance, but they sure don't know how to make checkbook management simple.

I'd heard a lot about *Quicken* and had been meaning to give it a try. *Quicken* has been spectacularly successful because it prints checks easily and keeps simple records that you can customize into splendid sophistication. The way I heard it, Andrew Tobias was going to go *Quicken* one better, with a program that's easier to use and that provides more value in the long run by putting some order into household budgeting.

So I tried both, starting with

Checkwrite Plus. After 20 minutes of fumbling in and out of Budget Categories, Money Accounts, and Loan Records—without succeeding in getting my checking account set up—I ran, nearly screaming for mercy, to *Quicken*. In less than 5 minutes, I was busily printing checks.

I dutifully returned to *Checkwrite Plus* for the purposes of this review. The interface is inherited from *Managing Your Money* and the structure is designed to organize your cash flow. It encourages you to have discipline, requiring that you pay attention to assigning payments to categories.

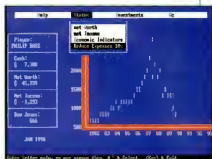
The manual guides you through the intricacies of predicting loan payments before it gets to the task at hand, printing checks.

If you want a program that will automate your bill paying, remember long account numbers, print checks in a flash, and save records, get *Quicken*. If you want to analyze your cash situation, set aside a few hours to pore over *Andrew Tobias' Checkwrite Plus*.

List Price: *Andrew Tobias' Checkwrite Plus*, \$69.95. **Requires:** 256K RAM, DOS 2.0 or later. Not copy protected. MECA Ventures Inc., 355 Riverside Ave., Westport, CT 06880; (800) 835-2246.

CIRCLE 413 ON READER SERVICE CARD

Wealth Insurance tracks your hypothetical fortunes in each of the available scenarios. When income is down, expenses must be cut.



PERSONAL FINANCE

The 1990s Economy: *Wealth Insurance Looks Ahead*

BY PHILLIP F. H. ROSE

It's the spring of '92, now 3 years into the Great Depression of the 1990s. Few saw it coming; even Black Monday in '87 didn't shake people up. Today the Dow is sitting at around 200, with unemployment at about 25 percent. But you are sitting pretty. You shorted stocks on the way down and have an extra \$20,000 sitting in T-bills. You still have your job, and you are just waiting for the stock market to heat up.

This is one scenario that you can play through in *Wealth Insurance*, a new financial simulation program based on the predictions of Paul Erdman, author of *The Crash of '89*. You take your finances through one of two scenarios for the '90s: depression or recession. Or you can see how well you would have done in the '30s depression, the '61 recession, or the '80s "boom" years.

Several good sources, including Erdman's own book *What's Next?*, offer solid advice on how to prepare for the bad economic times ahead. But

nothing hits home quite as effectively as facing the news, in this game, that your income has been cut by four-fifths and your mortgage must still be paid.

The game's main shortcoming is that it misses a golden opportunity to use the computer's power. You should be able to translate your current financial state into 1929 dollars and replay the Great Depression. Or plug in your actual numbers for 1981 and relive the 1980s with hindsight. Instead, the game forces you, when playing the historical scenarios, to assume a randomly assigned portfolio.

Other shortcomings arise from limits on your control over the game. Even if you make a simple typo and buy a Texas condo rather than New York land, you are stuck with it. You also cannot edit your personal financial statistics after leaving the first screen.

Rough economic times may be ahead. Of course, *Wealth Insurance* supports Erdman's predictions, but anyone can gain by playing the game and experimenting with strategies.

List Price: *Wealth Insurance*, \$39.95. **Requires:** 512K RAM, CGA or EGA video card, DOS 2.0 or later. Not copy protected. Britannica Software, Blue Chip Software Series, 315 Bay St., San Francisco, CA 94107; (800) 572-2272.

CIRCLE 414 ON READER SERVICE CARD



You fill in the blanks to pay your bills with *Andrew Tobias' Checkwrite Plus* and then assign the payments to categories for detailed budgeting. Unfortunately, it's not as easy as it sounds.

RS#	ADVERTISER	PRODUCT	PAGE#
395	PC Exchange	Programmers Tools Utilities	276
MULTIFUNCTION BOARDS			
*	Computer Discount Warehouse	Mail Order	365
ADD-ON BOARDS			
*	Computer Discount Warehouse	Mail Order	365
297	Intel	Bus/through Connection Co-Processor	261
190	Ortel Technology	Pro Designer Series	121
266	Swan Technologies/TCF	VGA Board	362-363
SCANNERS/DIGITIZERS			
135	Complete PC	The Complete Scanner	90
PRINTERS			
172	Bay Technical Associates	Print Master II	290
109	Computer Discount Warehouse	Mail Order	365
363	Eastman Kodak	Oxarc 150 Printer	220-221
491	Hewlett Packard-Peripherals Div	Desk Jet	154-155
326	Hewlett Packard-Peripherals Div	HP Laser Jet Printer	215
280	IBM Corp.	Quickwriter	278-279
286	LaserGo Inc.	Go Script	21
256	Minimaster Tally	MT 160 Laser Printer	312
259	The Laser Connection	Big Gun	6
PRINTER ACCESSORIES			
234	3X USA	3X Link 16	99
288	Fifth Generation	Logical Connection	117
126	Pacific Data Products, Inc.	25 In One Ports	78
290	Rose Electronics	Master Switch	228
290	Rose Electronics	Master Net	228
290	Rose Electronics	Master Link	228
PORTABLE/LAP COMPUTERS			
*	Computer Discount Warehouse	Mail Order	365
*	Computer Discount Warehouse	LAP Tablets	367
195	Intelligence Technology Corp.	"Cali" Cellular Laptop	20
321	Toshiba of America	Laptype	190-191
337	Zenith Data Systems	386 Turbo Sport, Portables	263
PC-FAX			
250	Brodatron Technology	Fax Mail	125
247	Computer Discount Warehouse	Mail Order	365
247	Xerox Imaging Systems	Fax Board	118
OPTICAL PERIPHERALS			
523/261	Compact Disc Products	CD-ROM WORM	274
DISPLAYS/MONITORS/TERMINALS			
*	Computer Discount Warehouse	Mail Order	365
*	Computer Discount Warehouse	VGA Display	367
153	MCI Home Electronics Inc.	Multisync 2A	344-345
150	Samtron	Color Monitors	204
496	Seko Instruments	Monitors	56
GRAPHICS SOFTWARE			
743	Digital Research	Artline	241
174	Formvision Corp.	Formvision	189
380	Hammerly Computer Services	Pro Bas	326
380	Hammerly Computer Services	Pro Bas Telecom Tool Kit	326
143	Peripherals Corp.	Graphics Software	84
744	Software Publishing	Ultra Vision	141
744	Z-Soft	Harvard Graphics	141
744	Z-Soft	Publisher's Paintbrush	225
PLOTTERS/CHARTING DEVICES			
117	Houston Instruments	Hi Plot Plus	258
VIDEO GRAPHICS BOARDS			
*	Computer Discount Warehouse	Mail Order	365
190	Ortel Technology	Pro Designer Series	121
ACCELERATOR BOARDS			
276	Hauptpage	386 Motherboards	32
COMMUNICATIONS SOFTWARE			
120	Central Point Software	PC Tools Deluxe 5.0	82
198	Cross International	Networking Solutions	109
276	Crosslink Communications	Remote Lins	76
904	Data Storm Technologies	Pro Comm	326
380	Hammerly Computer Services	Pro Bas Telecom Tool Kit	326
224	Norton-Lambert	Clone Up	194
COMMUNICATIONS			
290	Rose Electronics	Master Net	228
COMMUNICATIONS SOFTWARE			
735	Motor Technologies	Co-Session	318
267	Xpedit Systems	PC-Xpedit	151
LOCAL AREA NETWORKING			
234	3X USA	3X Link 16	99
278	Crosslink Communications	Remote Lins	76
298	Fifth Generation	Logical Connection	117
230	Main Lan	Main Lan	280
149	Newbridge Networks, Inc.	LAM	254
290	Rose Electronics	Master Net	228
290	Rose Electronics	Master Switch	228
239	Western Digital	Ethernet LAN	136-139
239	Worperfect Corporation	Worperfect Office	294

RS#	ADVERTISER	PRODUCT	PAGE#
MICRO-MAINFRAME LINKS			
124	Attachmate	Micro Mainframe Connectivity	301
MODEMS			
*	Computer Discount Warehouse	Mail Order	365
217	Dual Group	Peripherals	336
136	Heyes Microcomputer Products	Touchbase Systems	28
231	Touchbase Systems	Workport Series Modems	28
367	Universal Data Systems	Modems	343
DISKETTES			
*	3M Data Recording Products Div	Disks/ettes	201
267	3M Data Recording Products Div	Disks/ettes	203
INSURANCE			
728	Seawant	Insurance	230
POWER PROTECTION			
533	Marlington Microwave LTD	Masterproct	100
381	Pera Systems, Inc.	Masterman	72
473	PC Power and Cooling	Power Supplies	179
PC ACCESSORIES			
232	American Technology Labs	Disk Server	336
473	Curtis Manufacturing	PC Accessories	143
473	PC Power and Cooling	Cooling Devices	179
RETAIL DISTRIBUTORS			
222	Seizo	Toshiba Products	300
MAIL ORDER			
254	47 Street Computers	Mail Order	44-45
336	Arlington Computer Products	Mail Order	354-355
509	Austin Computers	Compatibles	10-11
481	Bay Express	Mail Order	365
481	Bay Express	Computer Accessories	60-61
481	Bay Express	Mail Order, Peripherals	357
481	Bay Express	Mail Order	347, 483
294	Computer Discount Warehouse	Mail Order	348, 349
183	Computer Discount Warehouse	Mail Order	365
178	Computer Masters	Mail Order	242-243
229	Educational Testing Service	Mail Order	371
332	FASTMCHD	Mail Order	53
243	Jade Computer Products	Mail Order	305
346	Jamexco Electronics	Mail Order	330
280	LaserGo Inc.	Go Script	21
387	MHI Warehouse, Inc.	Mail Order	364
129	Micro Warehouse	Mail Order	174-175
333/335	MICROBEST	Mail Order	365
333/308	PC Brand	Compatibles	180-181
309/304	PC Brand	Compatibles	182-183
319/311	PC Brand	Compatibles	184-185
*	PC Connection	Mail Order	184
*	PC Connection	Accounting Software	185-189
301	PC Exchange	Accounting Software	306
305	PC Exchange	Programmers Tools Utilities	276
353/355	PC Network, The New	Mail Order	367-368
295	RP Systems	Mail Order	361
184	Shenrock	Mail Order	356
375	Software Add-Ons	Mail Order	18-19
206	Telamart	Mail Order	82
123	Telamart	Mail Order	85-89
220	Texas Computer Express	Mail Order	362
266	Texas Computer Products	Mail Order	362-363
105	USA Flex	Mail Order	308-309
*	Warehouse Data Products	Mail Order	252
171	Warehouse Data Products	Mail Order	253
231	Zeo International	Clones	229-231
ON LINE DATABASES			
497	Down Jones News/Retrieval	News Retrieval	85
497	PC Magnet	On Line Database	265
DIRECT MARKETING CONNECTION			
336	Arlington Computer Products	Mail Order	354-355
255	Bay Express	Mail Order	369
355	Business To Business	Mail Order	357
252	Clone Computers	Mail Order	360
254	Clone Computers	Mail Order	341-346
254	Clone Computers	Mail Order	345, 349
*	Computer Discount Warehouse	Mail Order	365
109	Computer Discount Warehouse	Mail Order	367
178	Computer Discount Warehouse	Mail Order	369
178	Computer Discount Warehouse	Mail Order	371
483	Danmark International	Mail Order	366
229	Educational Testing Service	Mail Order	371
243	Jade Computer Products	Mail Order	370
346	Jamexco Electronics	Mail Order	366
387	MHI Warehouse, Inc.	Mail Order	364
129	Micro Warehouse	Mail Order	350
333/335	MICROBEST	Mail Order	365
333/308	PC Brand	Mail Order	353-353
309/304	PC Brand	Mail Order	361
319/311	PC Brand	Mail Order	356
258	Texas Computer Express	Mail Order	363
258	Texas Computer Products	Mail Order	363-363
105	USA Flex	Mail Order	358-359

AFTER HOURS



Andrew Tobias Shows You How to Manage a Modest or Major Fortune

BY CHRISTOPHER BARR

Andrew Tobias' *Managing Your Money* is the menu-driven alternative to having a personal financial adviser, private secretary, and bookkeeper. It's not a difficult program to master, but, like your parents used to tell you about any complex project, you only get out of it what you put into it.

Created by Andrew Tobias, the author of a number of best-selling books on personal investing, *Managing Your Money* is a complete system that lets you keep control of your income and outgo. Since it's not written in a double-entry, accounting-only style, this software can be appreciated by young people with only a checking account, as well as by more-sophisticated investors with complicated portfolios.

Although the multiplicity of menus may drive a power user crazy, the program has a consistent, easy-to-learn user interface. There is context-sensitive help throughout the software, which is organized as a series of "chapters."

Managing Your Money operates as a series of connected databases that track all the assets and liabilities that make up your financial body. The core of the program tracks two main areas of your finances—your budget (including your checkbook) and your investment portfolio. The rest of the program helps with topics like estimating your federal income taxes, determining how much insurance you should carry, and setting up your kid's college fund.

In the Budget and Checkbook chapter, you track all of your money accounts. This in-

cludes checking, savings, and charge-card accounts. The number of accounts you can set up is limited only by storage.

Setting up accounts is not difficult, but it is time-consuming. Fortunately, both the manual and the on-line help are written with an ease and humor that make the tedium of the setup easier to bear. After you've finished this task, it shouldn't take more than an hour or two a week to keep your record current. Once an account has been entered—a checking account, for instance—you can work with the account and spend or receive money.

Spending consists of writing checks (or any other kind of disbursement), while deposits are recorded as money received. When you record a check, you can allocate the amount to a predetermined budget category and thus track your spending. You can purchase preprinted checks and have *Managing Your Money* actually print them.

The Budget and Checkbook chapter has some other useful functions. You can forecast cash flow and track loans, for instance. If you have a small business, you can call up an accounts-payable module, and a receivables module, too.

The other major section of *Managing Your Money* is the Portfolio Manager. This is

Each portfolio can handle a number of individual transactions. Andrew Tobias' *Managing Your Money* includes the value of all assets when it calculates your net worth.

Each portfolio can handle a number of individual transactions. Andrew Tobias' *Managing Your Money* includes the value of all assets when it calculates your net worth.

Portfolio	Positions	Current Price	Value	Cost	Unrealized Gain/Loss
100	100	1.75	175	100	75
100	100	1.75	175	100	75
100	100	1.75	175	100	75
100	100	1.75	175	100	75

Speed scroll - F12 - Return to HOME screen

where you keep track of the bulls and bears, stamps and coins, and other equity instruments you own. It doesn't matter if you have one investment or 100; *Managing Your Money* can track them all. You can establish taxable, nontaxable, cash-management, and hypothetical portfolios. Unfortunately, dividends and interest aren't calculated and added automatically. You'll have to do that yourself.

Not the least important of *Managing Your Money's* tools is the Financial Calculator. Among other things, it will analyze your retirement package, tell you if you should refinance your mortgage, or scare you to death with the cost of junior's Harvard education.

The most fun you'll have is when you get to chapter 8, which calculates your net worth. *Managing Your Money* considers all of the proper asset and liability accounts, recognizes which accounts to include and which to ignore, and calculates your worth.

Managing Your Money comes on five 360K disks and requires only 256K RAM and a single disk drive, but you will want a hard disk and a minimum of 512K for maximum productivity. *Managing Your Money* uses 1.5MB of disk space before you enter your first record. Version 5.0, updated to reflect the tax code that's applicable for the tax year of 1988, does not use either expanded or extended memory.

Andrew Tobias' *Managing Your Money* is the complete financial management tool it claims to be. It won't tell you which stocks to buy or sell, when to refinance your mortgage, or when to invest in Japanese yen futures. But good, sound fiscal advice is available to you on practically every screen.

List Price: Andrew Tobias' *Managing Your Money*. Version 5.0, \$219.98. **Requires:** 256K RAM, DOS 2.0 or later. Not copy protected. MECA Ventures Inc., 355 Riverside Ave., Westport, CT 06880; (800) 835-2246.

Andrew Tobias' *Managing Your Money* exports the taxable projections to be used in the Tax Estimator chapter.

Category	Type	Amount	Total	Tax Category
100	100	1.75	175	100
100	100	1.75	175	100
100	100	1.75	175	100
100	100	1.75	175	100

Speed scroll - F12 - Return to HOME screen

After you establish the budget categories, Andrew Tobias' *Managing Your Money* exports the taxable projections to be used in the Tax Estimator chapter.

CIRCLE 412 ON READER SERVICE CARD



INDEX TO ADVERTISERS

RS #	ADVERTISERS	PAGE	RS #	ADVERTISERS	PAGE	RS #	ADVERTISERS	PAGE
267	3M Data	201	352	FASTMICRO	53	372	PC Designs	256
234	3M USA	263	286	Fifth Generation	188	301	PC Exchange	309
254	47th St. Computer	99	288	Fifth Generation	177	395	PC Exchange	276
483	Advanced Logic Research	44-45	319	FiveStar Electronics	302	353	PC Network, The New	361
200	AGFA CompuGraphics	174	174	FormWork Corp.	169	536	PC Network, The New	352-353
270	Altac Technology Corp.	286-289	323	Funk Software	68-69	473	PC Power & Cooling	179
179	Amac Engineering	171	237	Funk Software	131	358	Peachtree Software	259
335	American Mitac	267	213	Gateway 2000	93	282	Personics Corp.	17
232	American Technology Labs	111	266	GenTech	305	143	Personics Corp.	9
336	Arlington Computer Products	338	369	Golden Bow Systems	4	302	Peter Norton Computing	260-261
166	AST Research	354-355	380	Hammerly Computer Services	326	*	Plus Development	272-273
124	Attachmate	145-147	351	Hard Drives International	331	529	Public (Software) Library	162
509	Austin Computer	381	276	Hauptpage	32	192	Quantum Software Systems, Inc.	153
*	Bay Express	10-11	201	Haventree Software	170	290	Rose Electronics	228
172	Bay Technical Associates	368	136	Hayes Microcomputer Products	327	295	RP Systems	210
482	Bedford Software Corp.	167	167	Helix Software	04	728	Safeware	361
116	Besse Computing	49	326	Hewlett Packard	215-216	150	Samtron	254
140	Bloc Publishing	328	491	Hewlett Packard	154-155	470	SBT Corp.	113
137	Borland International	66	117	Houston Instruments	268	*	Seagate	246
377	Borland International	55	338	Hyundai	148	222	Seico	309
250	Brooktrout Technology	67	*	IBM	24-25	490	Seiko Instruments	58
481	Buildup Computer Products	125	*	IBM	278-279	184	Shamrock	358
355	Business to Business	60-61	244	Information Builders	232	*	Softline	10-19
494	Buttonware	357	297	Intel	C2-61	334	Softlogic Solutions	39
120	Central Point Software	168	195	Intelligence Technology Corp.	20	375	Software Add-Ons	92
134	Clarion Software	82	*	Intuit	29	*	Software Publishing	141
252	Clone Computers	70	243	Jade Computer	370	227	Sourcemate Information Systems	335
188	Command Technology Corp.	360	346	Jameco Electronics	368	101	SPSS, Inc.	323
523/261	Compact Disk Products	152	533	Kensington Microwave, Ltd.	100	366	Sun Microsystems	159-161
135	Complete PC	274	193	Kinson Products	274	299	SWFTE International, Ltd.	37
294	CompuAdd Corp.	90	200	LaserGo, Inc.	21	249	Symantec	61
320	CompuAdd Corp.	346-349	182	Logitech	238-239	289	Tandy Corp.	323
102	Computer Associates	248-247	263	Macola, Inc.	100-107	264	Tandy Corp.	333-339
*	Computer Discount Warehouse	12-13	*	Magnavox	337	384	Tecon Inc.	248
*	Computer Discount Warehouse	365	726	Mannesmann Tally	312	123	Telemart	88-89
109	Computer Discount Warehouse	367	* Maxell	79	206	Telemart	86-87	
183	Computer Mail Dirder	369	155	Metro Image Base, Inc.	316	220	Tenex Computer Express	366
178	Computer Oasis	242-243	387	MHI Warehouse, Inc.	364	259	The Laser Connection	5
163	Computer Products United	371	129	Micro Warehouse	174-175	248	Timeworks, Inc.	129
113	Concentric Data Systems	310-311	*	MICROBEST	350	321	Toshiba of America	190-191
315	Concentric Data Systems	165	* Micrografx	84	231	Touchbase Systems	28	
198	Core International	163	480	Micropro International	342-343	735	Triton Products	318
370	Corel Systems	109	* Microsoft	2-3	268	Tussey Computer Products	362-363	
194	Cougar Mt. Software	123	* Microsoft	324	530	Tussey Computer Products	22-23	
278	Crosstalk Communications	250	* Microsoft	282	337	Universal Data Systems	340	
* Curtis Manufacturing	76	331	Microway	330	105	USA Flex	358-359	
* Dac Software	143	233	Mitsubishi International Corp.	26	230	US Sage	280	
* Dac Software	67	170	Multisoft Corporation	314	*	Vendex	211	
483	Damark International	74-75	153	NEC Home Electronics Inc.	344-345	731	Vendex	213
504	Dataterm Technologies Inc.	366	149	Newbridge Networks, Inc.	254	171	Warehouse Data Products	252-253
385	Deerfield Systems	144	* Northgate Computer Systems	283-285	513	Wells American	50	
536	Dell Computer Corporation	133	* Northgate Computer Systems	287-289	515	Wells American	14	
256	Delta Technology	316	* Northgate Computer Systems	306-307	203	Wesson International	322	
742	Diamond Flower Electric Instruments	237-238	* Northgate Computer Systems	255	239	Western Digital	138-139	
743	Digital Research	C3-C6	* Northgate Computer Systems	329	485	Westlake Data	317	
* Dow Jones News/Retrieval	210	224	Norton-Lambert	104	*	Wordperfect Corp.	294	
349	DSC Communications	127	* Dracle	42	247	Xerox Imaging Systems	151	
217	Dual Group	241	* Dracle	47	287	Xpedit Systems	151	
379	Dyna Computers	85	190	Orchid Technology	121	744	Z-Soft	225
363	Eastman Kodak	126	126	Pacific Data Products, Inc.	78	337	Zenith Data Systems	293
229	Educational Testing Service	381	381	Para Systems, Inc.	72	723	Zenos International	229
216	Envera Systems, Inc.	178	303/308	PC Brand	186-181	721	Zenos International	229-231
		229-221	309/304	PC Brand	182-183	316	Zylab Corp.	16
		371	310/311	PC Brand	184-185			
		96-91	* PC Connection	184-189				

*No Reader Service #. Please call advertiser for information.

AFTER HOURS



PERSONAL FINANCE

Small Investors Hit the Big Time with Quotron Open Windows

BY TONY RIZZO

What major advantage do professional stockbrokers have over the lowly "small investor"? The smug answer would have to be "insider trading." But in all seriousness, access to information is the key to modern-day investment analysis and strategy.

Where do the pros get this valuable information? The ubiquitous Quotron terminal is the primary professional trading tool to have emerged over the last decade or so. This weapon puts a wide assortment of financial data right at the professional

investor's fingertips.

What can the serious small investor do to compete with the big boys, especially when the heavyweights have easy access to all this critical information? Simple—join the club. With *Quotron Open Windows*, a *Microsoft Windows*-based collection of applications designed by Innmark in conjunction with Quotron Systems, the little guy can do just that.

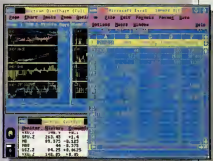
QuotTerm

Quotron Open Windows consists of three specific applications, the first of which, *QuotTerm*, provides complete emulation of the professional's Quotron terminal. *QuotTerm* supports all standard terminal features but, because it is *Windows*-based, it offers substantial visual enhancements over the standard, character-based terminal. All of the usual *Windows* features are available. For instance, you can resize the *QuotTerm* window and point and click with the mouse to obtain quotes or news stories. Blink rates and colors can be used to define to customize the display of information about securities.

QuotData

Along with *QuotTerm* comes *QuotData*, an application that functions as a database and server for financial data. Every sort of historical financial fact is available on-line from Quotron via the underlying Quotron network. Even more important, *QuotData* collects real-time, tick-by-tick data on securities, futures, and other instruments,

QuotData supplies information to programs such as *Microsoft Excel* (right side of screen) and to *QuotChart*.



in the process of building a user-defined database of absolutely current information. It also distributes the information.

QuotData acts as a server for other *Windows* programs (*Microsoft Excel*, for example), with which it communicates through *Windows*' Dynamic Data Exchange (DDE) protocol. The database information becomes available to other applications either in real time, as *QuotData* actively collects data, or through stored historical information.

QuotChart

QuotChart rounds out the trio of applications that make up *Quotron Open Windows*. As its name suggests, *QuotChart* is an advanced and very sophisticated charting and analysis tool. Its features go well beyond those of any other charting package that I've seen.

Charting historical data is simple. You define the data and the desired time frame, and then apply your analysis. Just about everything can be done by pointing and clicking with the mouse. As many as eight charts at a time instantly come to life, displaying trendlines, moving averages, Gann angles, and much, much more. And best of all, it's all in real time.

Such sophistication does not come without a price. After all, this is the very same software professional traders use. Quotron charges monthly fees for the use of the applications, and there is a one-time, \$500 installation charge. In addition, you will need fairly heavy-duty PC hardware, probably including at least 2MB of RAM, to use these packages.

Is it necessary to install *Quotron Open Windows* to manage your first employee stock options purchase? Of course not. But if you are a serious investor with a great deal of time on your hands and money invested in your portfolio, membership in the big boys' fraternity is now open to you.

List Price: *Quotron Open Windows* installation fee, \$500. **Requires:** 80286- or 80386-based PC. **Microsoft Windows. List Price:** *QuotChart*, \$300 monthly fee, *QuotData*, \$250 monthly fee, *QuotTerm*, \$100 monthly fee. **Requires:** 2MB RAM (640K RAM for *QuotTerm*), hard disk, serial port, EGA or VGA graphics, mouse, DOS 3.2 or later. Not copy protected. Quotron Systems Inc., 12731 W. Jefferson Blvd., Los Angeles, CA 90066; (213) 302-4621.

CIRCLE 411 ON READER SERVICE CARD

AFTER HOURS INDEX

Andrew Tobias' Managing Your Money Software that minds your budget and tracks your investments.

Andrew Tobias' Checkwrite Plus A complicated solution to a simple task: managing your checking account. **Wealth Insurance** How to hold on to what you've got in the uncertain future.

Bubble Ghost An imaginative, arcade-style game for boys and ghouls of all ages.

Star Saga: One A hybrid game that combines the PC with a traditional board game.

Technically speaking, the Dell System 325 is the most advanced 386™ computer we've ever built.

And, according to PC Magazine, it's one of the most advanced 386 computers they've ever tested.

In benchmark after benchmark, the System 325 ran circles around a field of 386-based 25 MHz systems. A field that included the Compaq® 386/25.

A show of prowess that earned the System 325 PC Magazine's

we've sold to date, each and every one has been individually configured to fit the needs of its owner.

The System 325 takes that idea to its logical extreme.

For example, it runs either MS-DOS® OS/2, or our own Dell UNIX® System V. Which is compatible with AT&T's System V Interface Definition. And the whole world of XENIX® applications.

If speed is of the essence, we

can include an optional Intel® 80387 or WEITEK 3167 math coprocessor.

And since nothing about this system is lightweight, the mass storage is a 90 MB ESDI disk drive. Or we can configure it with a 150 or 322 MB unit.

As you might expect, the output is just as intense. You can choose between VGA mono with paperwhite screen, or VGA Color Plus, for high resolution colors displayed on

**THE DELL 386 SYSTEM 325
HAS A 25 MHz CLOCK RATE,
CACHE MEMORY CONTROLLER,
90 MB 18ms ESDI DRIVE,
PAGE MODE INTERLEAVED MEMORY,
AND 100% COMPATIBILITY WITH
MS-DOS, OS/2 AND UNIX SYSTEM V.**

Editor's Choice award.

It was a goal we set for ourselves from the very beginning. And an objective anyone with a penchant for power and performance can appreciate.

**A PERSONAL
COMPUTER
THAT'S REALLY
PERSONAL.**

Of the more than 150,000 personal computers



a larger screen.

Even though the System 325 gives you all this performance, it still leaves you six open slots for whatever else you might want to add.

And once you've told us what you want, we'll make sure what you want works—by burning-in the entire system unit.



Paul Sen

"The new top
Dell System 325 is a
flagship worth putting
out in front of the fleet."

For the full story, see inside back cover.

February 14, 1989

